Service
Manual

MX100/MW100
Data Acquisition Unit

YOKOGAWA
Yokogawa Electric Corporation

SM MX100-01E
2nd Edition

Important Notice to the User

This manual contains information for servicing YOKOGAWA's MX100/MW100 Data Acquisition Unit. Check the serial number to confirm that this is the correct service manual for the instrument to be serviced. Do not use the wrong manual.

Before any maintenance and servicing, read all safety precautions carefully.

Only properly trained personnel **may carry out the maintenance and servicing described in this service manual.**

Do not disassemble the instrument or its parts, **unless otherwise clearly permitted by this service manual.**

Do not replace any part or assembly, **unless otherwise clearly permitted by this service manual.**

In principle, Yokogawa Electric Corporation (YOKOGAWA) does not supply parts other than those listed in the customer maintenance parts list in this service manual (mainly modules and assemblies). Therefore if an assembly fails, the user should replace the whole assembly and not components within the assembly (see "Note"). If the user attempts to repair the instrument by replacing individual components within the assembly, YOKOGAWA assumes no responsibility for any consequences such as defects in instrument accuracy, functionality, reliability, or user safety hazards.

YOKOGAWA does not offer more detailed maintenance and service information than that contained in this service manual.

All reasonable efforts have been made to assure the accuracy of the content of this service manual. However, there may still be errors such as clerical errors or omissions. YOKOGAWA assumes no responsibility of any kind concerning the accuracy or contents of this service manual, nor for the consequences of any errors.

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Note

YOKOGAWA instruments have been designed in a way that the replacement of electronic parts can be done on an assembly (module) basis by the user. YOKOGAWA instruments have also been designed in a way that troubleshooting and replacement of any faulty assembly can be done easily and quickly. Therefore, YOKOGAWA strongly recommends replacing the entire assembly over replacing parts or components within the assembly. The reasons are as follows:

- Repair of components can only be performed by specially trained and qualified maintenance personnel with special tools. In addition, repair of components requires various special parts and components, including costly ones. It also requires facilities where highly-accurate and expensive maintenance equipment and special tools are provided.
- When taking the service life and cost of the instruments into consideration, the replacement of assemblies offers the user the possibility to use YOKOGAWA instruments more effectively and economically with a minimum in downtime.

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Revisions

1st Edition: September 2003
2nd Edition: October 2006

2nd Edition : October 2006 (YK)
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Safety Precautions

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Yokogawa Electric Corporation assumes no liability for the customer's failure to comply with these requirements.

WARNING

This service manual is to be used by properly trained personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to the safety precautions prior to performing any service. Even if servicing is carried out by qualified personnel according to this service manual, YOKOGAWA assumes no responsibility for any result occurring from this servicing.

Use the Correct Power Supply
Ensure the source voltage matches the voltage of the power supply before turning ON the power.

Connect the Protective Grounding Terminal
Make sure to connect the protective grounding to prevent electric shock before turning ON the power .

Do Not Impair the Protective Grounding
Never cut off the internal or external protective earth wire or disconnect the wiring of the protective earth terminal. Doing so invalidates the protective functions of the instrument and poses a potential shock hazard.

Do Not Operate with Defective Protective Grounding or Fuse
Do not operate the instrument it the protective earth or fuse might be defective. Make sure to check them before operation.

Do Not Use in the Presence of Flammable Liquids, Vapors, and Dust
Do not use the instrument in the presence of flammable liquids, vapors, and dust. Operation in such environments constitutes a safety hazard.

Do Not Remove Covers
The cover should be removed by YOKOGAWA's qualified personnel only. Opening the cover is dangerous, because some areas inside the instrument have high voltages.

Ground the Instrument before Making External Connections
Connect the projective grounding before connecting to the item under measurement or to an external control unit.

Damage to the Protective Structure
Operating the instrument in a manner not described in this manual may damage its protective structure.

Safety Symbols Used on Equipment and in Manuals

Danger. Refer to corresponding location on the instrument. This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.

Foundational ground terminal (do not use this terminal as a protective ground terminal.)

WARNING

Calls attention to actions or conditions that could cause serious injury or death to the user, and precautions that can be taken to prevent such occurrences.

CAUTION

Calls attentions to actions or conditions that could cause light injury to the user or damage to the instrument or user' s data, and precautions that can be taken to prevent such occurrences.

Note

Call attention to information that is important for proper operation of the instrument.

Overview of This Manual

This manual is meant to be used by qualified personnel only. Make sure to have read the safety precautions at the beginning of this manual and the warnings/cautions contained in the referred chapter prior to carrying out any servicing.

This manual contains the following chapters:

1 Principles of Operations
Describes the functions of various assemblies and lists safety considerations.

2 Testing
Describes the tests for checking performance of the instrument.

3 Adjustments
Describes the adjustments which can be performed by users.

4 Troubleshooting
Describes procedures for troubleshooting and what to do in case parts need to be replaced.

5 Schematic Diagram
Gives the system configuration diagram.

6 Customer Maintenance Parts List
Contains exploded views and a list of replaceable parts.

7 Procedures for Disassembly
Lists the steps required to remove parts from the instrument.

Specifications are not included in this manual. For specifications, refer to IM MX100-01E or IM MW100-01E.

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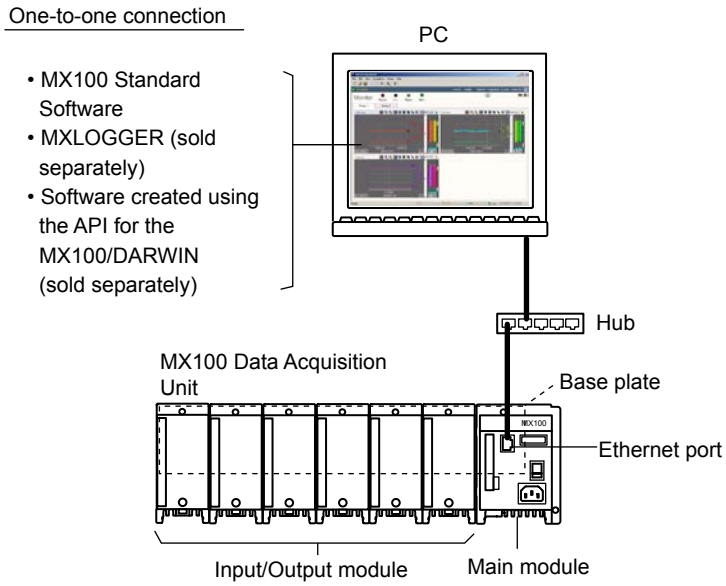
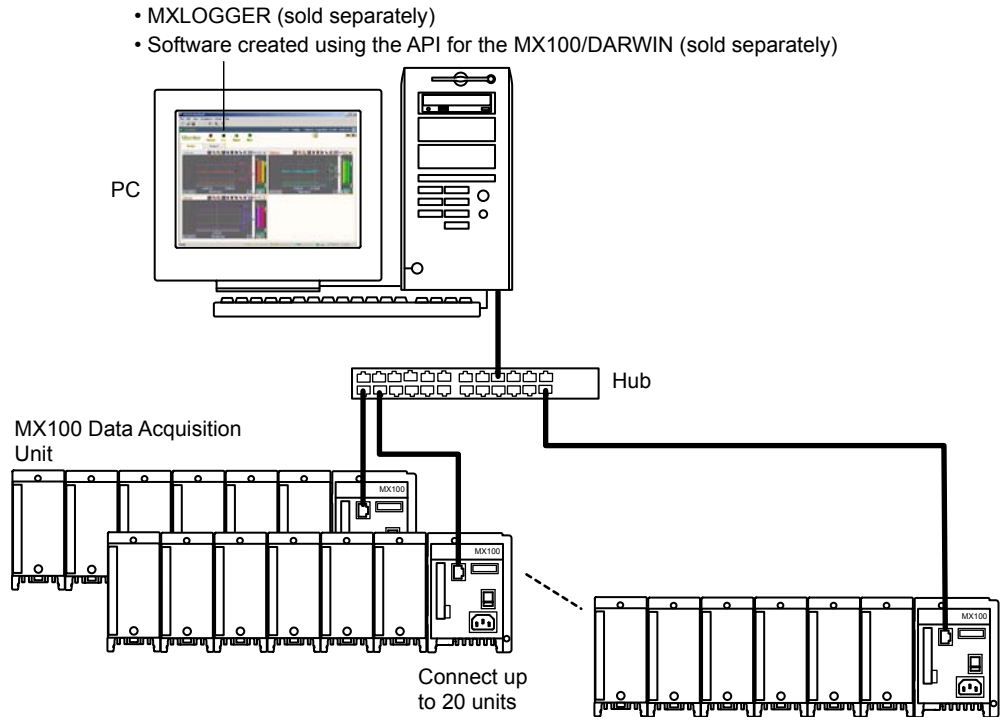
1.1 MX100 System Overview

The MX100 Data Acquisition Unit consists of (1) the main module equipped with an Ethernet port, (2) input/output modules that perform input or output of signals, and (3) the base plate that attaches and connects the modules. By connecting the main module and a PC via the Ethernet interface and installing the dedicated software program indicated below into the PC, you can configure the acquisition conditions of the measured data from the PC as well as monitor and acquire the measured data on the PC. One to 20 MX100 Data Acquisition Units can be connected to a single PC (one unit using the MX100 Standard Software, one to 20 units (or up to 1200 input channels) using the MXLOGGER).

One-to-one connection

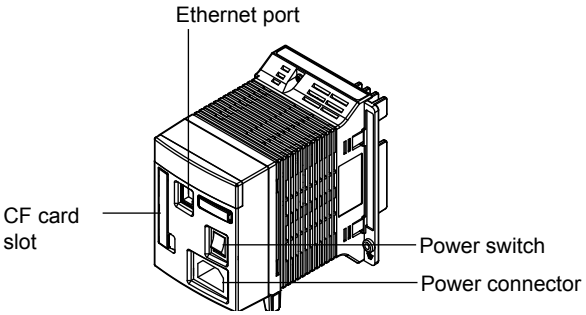


One-to-N connection



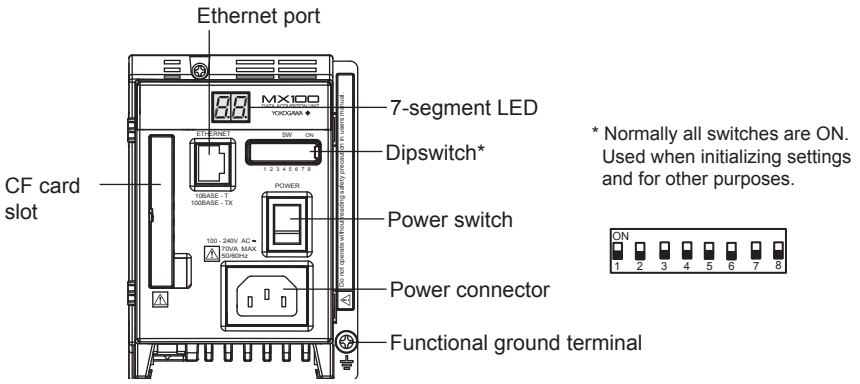
Main Module

The main module is equipped with a power supply connector, a power switch, an Ethernet port, a CF card slot, and other parts. It contains functions such as the power supply to and the control of each input/output module, communications with a PC, data storage to the CF card when communication is disconnected.



1.2 MX100 Main Module Functions

The main module is the heart of the MX100 Data Acquisition Unit. For details, see the user's manual (IM MX100-01E).



Contents Displayed on the 7-Segment LED

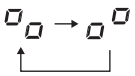
The two-digit 7-segment LED displays the unit number, operating status, operation complete, and operation error of the MX100 Data Acquisition Unit.

Unit Number Display

Since a single MX100 Data Acquisition Unit can be connected to a PC on the MX100 Standard Software, the unit number is fixed to 00 and displayed as 00 When using MXLOGGER (software sold separately) that allows up to 20 MX100 Data Acquisition Units to be connected, the unit number can be set in the range of 00 to 19 and dsplayed as 00 to 19.

Display of the Self-Test Operation at Power on

When the power is turned ON, the LED displays startup indications (such as 88), and a self-test is carried out. While the self-test is in progress, the following displays are repeated.



Operation Mode Display

The MX100 Data Acquisition Unit has three operation modes: idle mode, measurement mode, and backup mode (measured data saved to a CF card due to the disconnection of communications). The modes are displayed as shown below. If the figure below, 00 indicates the unit number. If the unit number is not 00, the specified unit number is displayed.

- Idle mode
  00
  Two zeroes
- Measurement mode
  00.
  Two zeroes and a dot
- Backup mode
  0.0.
  Two zeroes and two dots

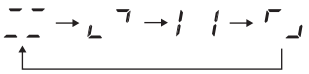
Display When Operation Is Complete

The figure below shows the display that appears when an operation such as IP address configuration and measurement condition change is completed. In the figure below, 00 indicates the unit number. If the unit number is not 00, the specified unit number is displayed.

00 → Turns off for 1 second → 00

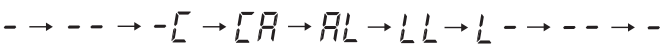
Display While Processing Is in Progress

The displays shown below repeats when there is access to the CF card, when the CF card is being formatted, or when calibratior is taking place.



Unit Confirmation Display

The figure below shows the display that appears when you confirm the MX100 Data Acquisition Unit that is connected using the MX100 Standard Software or MXLOGGER (software sold separately). The word "—CALL—" flows through the display from right to left.



For details on the display and meaning of operation errors, see section 3.1 "Error Display on the 7-Segment LED and Corrective Actions" of the user's manual (IM MW100-01E).

1.3 MW100 System Overview

MW100 Data Acquisition Unit

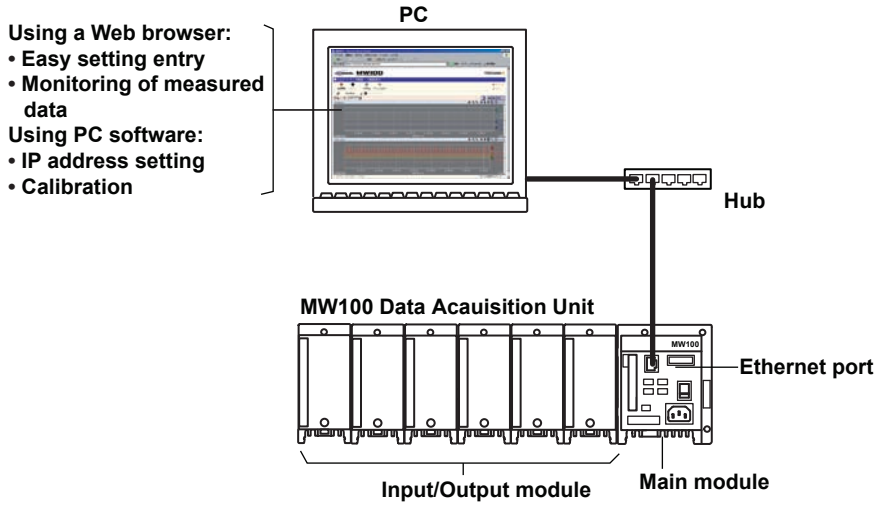
The MW100 Data Acquisition Unit consists of a main module equipped with an Ethernet port, I/O modules for input and output of signals (these are the same as those for the MX100 Data Acquisition Unit), and a base plate on which the first two items are mounted. The main module comes with a HTTP server function, allowing users to easily enter settings and monitor measured data from a PC using a browser. The MW100 can be used for data acquisition on site as a standalone, enabling data acquisition on up to 360 channels using the Modbus/TCP function.
For details, see the user's manual (IM MW100-01E).

System Configuration

The MW100 Data Acquisition Unit can be flexibly configured for a variety of measuring environments.

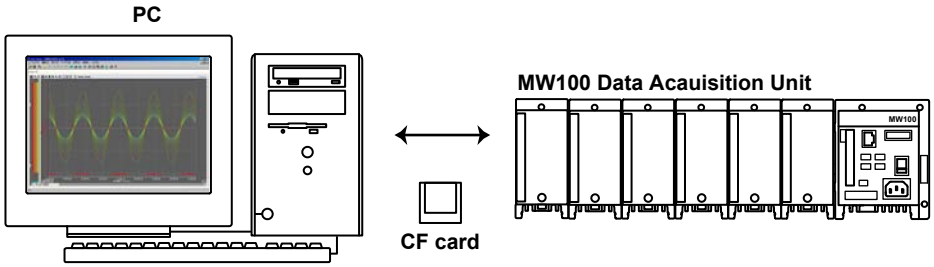
One-to-one Connection with a PC

This is an example of a system for small scale logging, setting the IP address, and other tasks.



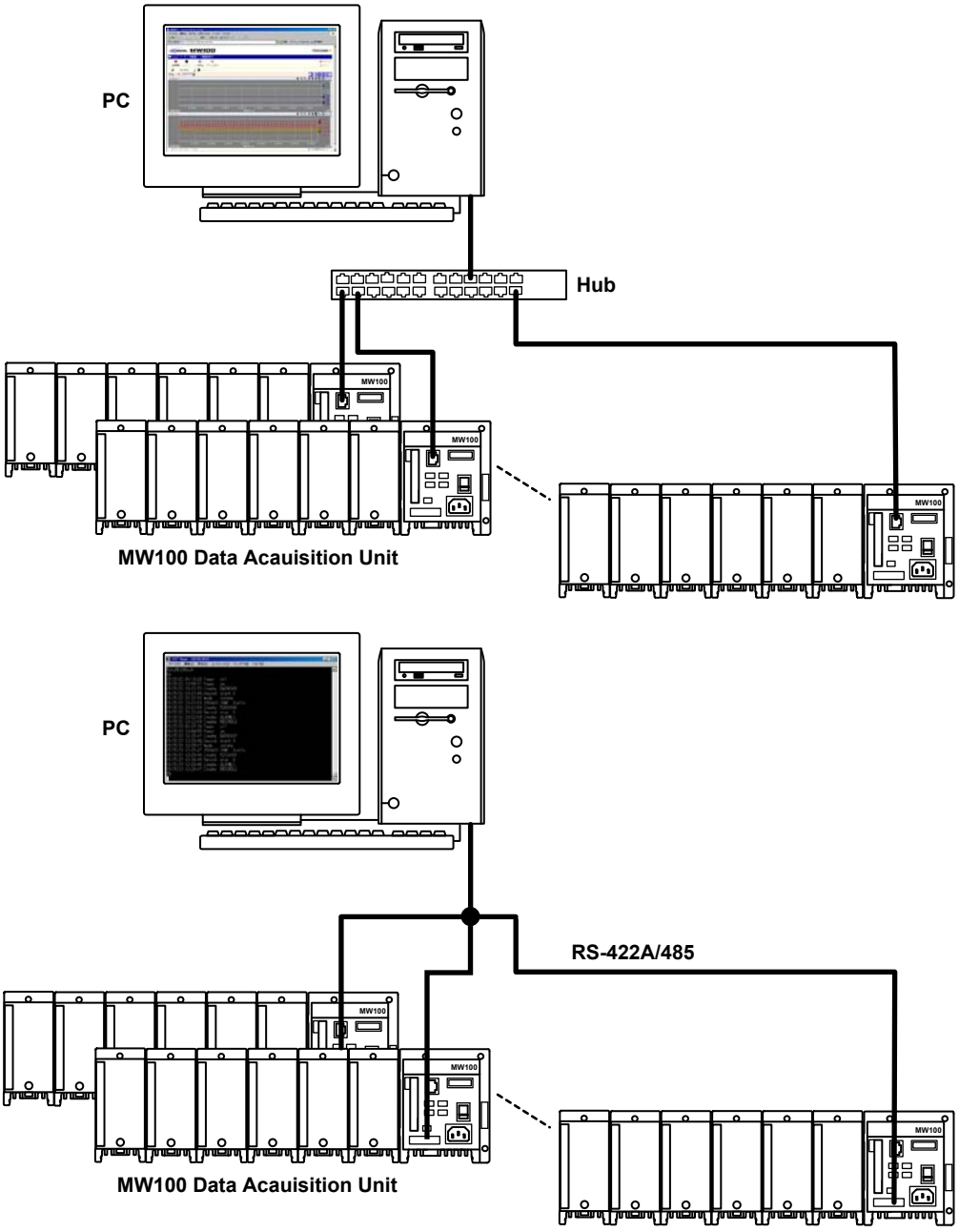
Standalone Configuration

This is an example of configuration for an on-site standalone data acquisition system.



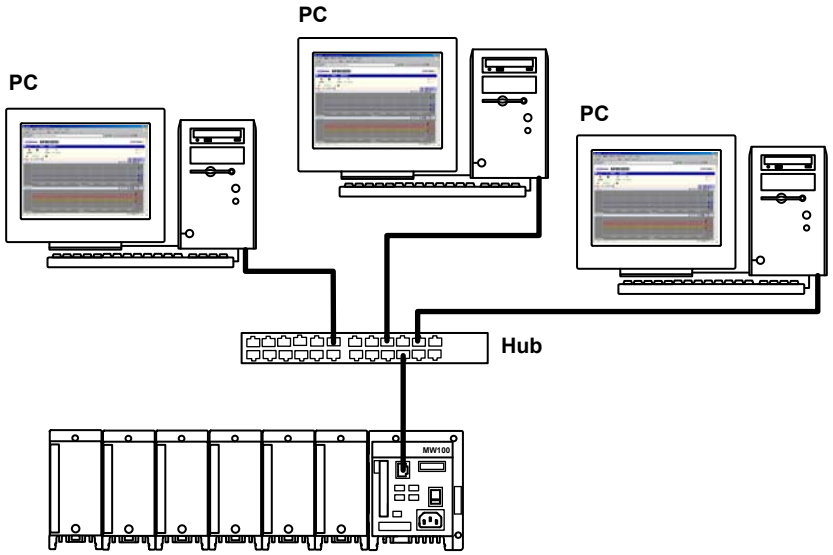
One-to-N Connection with a PC

This is an example of a configuration suitable for relatively large scale data acquisition tasks. Connections can be made via Ethernet or RS-422A/485.



One-to-N Connection with the PC

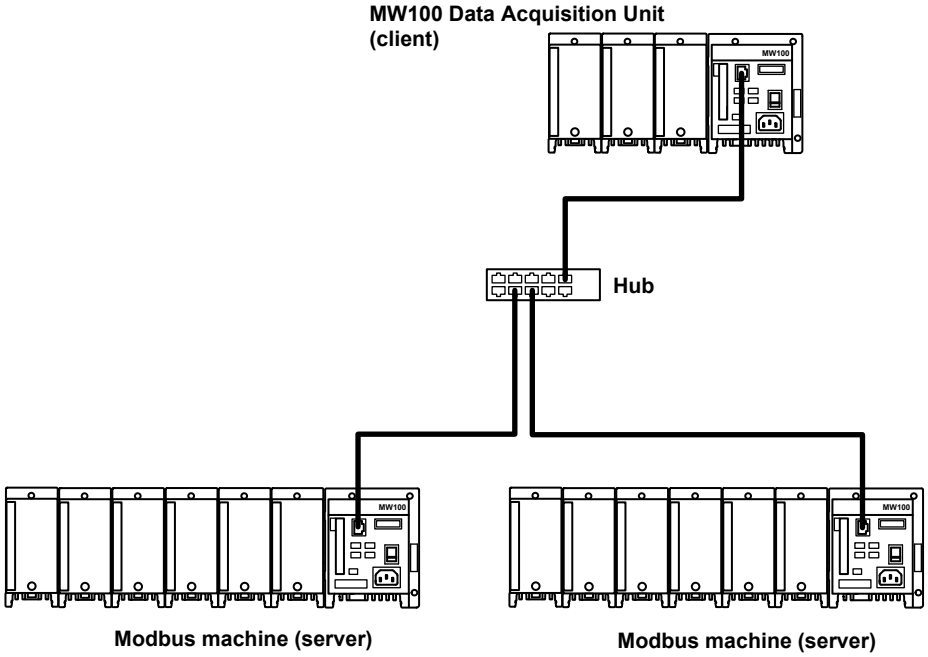
This is an example in which multiple PCs are connected to the MW100 for performing data monitoring.



MW100 Data Acquisition Unit

Connecting to Modbus Devices

This is an example of configuration of a system with connections to Modbus devices.



Modbus machine (server)

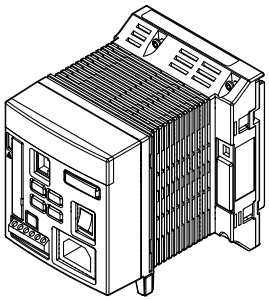
Modbus machine (server)

Note

Using the Web monitor or other communciation functions while using the Modbus function may affect the Modbus communication response.

Main Module

The main module is equipped with power supply connectors, a power switch, Ethernet ports, and other devices facilitating supply of power to and control of the input/output modules, and connection to networks.
It also has Start and Stop keys, meaning that since data can be saved to a CF card, data can be acquired offline. Data acquisition via serial communication is also possible by adding the RS-232 or RS-422A/485 serial communication option.



1.4 Functions of the MW100 Main Module

The main module is the central component of the MW100 Data Acquisition Unit.

Names and Functions of Parts

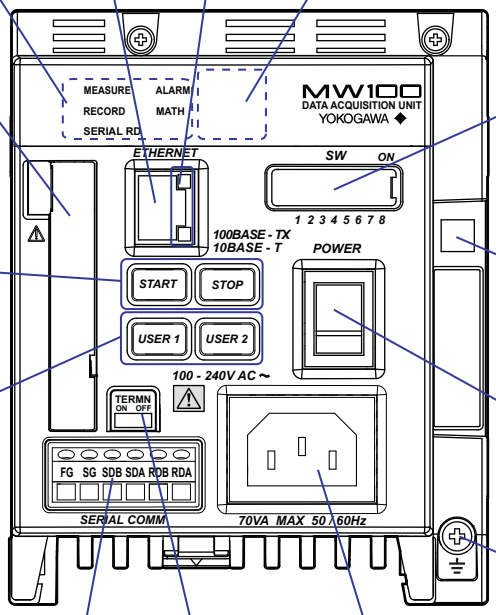
Ethernet port
Used for main unit settings and network connections

Communication status LED
Check the communication status
Top: LINK LED
Illuminates orange when ready for communication
Bottom: ACT LED
Blinks green when packets are sent/received

Status indicator*
The operational status of the instrument is indicated by the illumination of the LED.

7-segment LED
Displays the operational status of the MW100.

CF card slot
Insert the CF card to save data and perform other tasks.



Dip switch 1
Used to initialize settings, and for other purposes.

Start/Stop keys
Start and stop measurement, computation, and recording.

Dip switch 2
Not used.

User function key
Assign functions to the keys

Power switch
Turns the power to the MW100 main unit ON and OFF

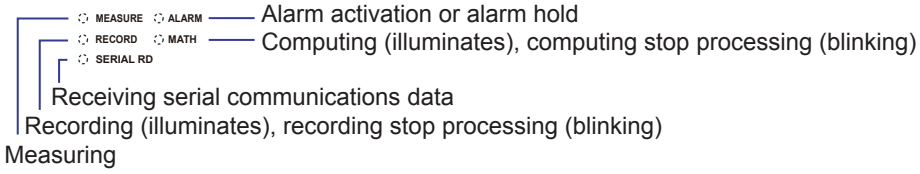
Functional ground terminal

Power supply inlet
Connect the accessory power supply cord This is listed as a screw terminal in the power supply specifications.

RS-422A/485 connector (/C3 option)
Depending on installed options, the connector may or may not be available, or it may be an RS-232 connector (/C2 option).

Terminator switch (/C3 option)
Turns the terminator ON and OFF

***Status indicators**
Illuminate in the following situations.



Switches and Keys

The MW100 has the following switches and keys. Some are included with options.

- Start and Stop keys
- User function key 1
- User function key 2
- Dip switch 1
- Dip switch 2
- Terminator switch (/C3 option)
- Power switch

User Function Keys

Actions set up using the Event/Action function can be executed by pressing the user function keys on the front panel of the MW100.

The keys are assigned as follows by default.

Key	Display	Action
User function key 1	USER1	Write to setting values file
User function key 2	USER2	Load setting values file

Dip Switch 1

Used to initialize the MW100 settings and for other functions.

- Normal operation

- Initialization of IP addresses and other settings

- Fixed IP address (192.168.0.10)

- 10-Mbps half-duplex Ethernet communication

- Firmware update

Main unit

Web

Dip Switch 2

Turn all switches ON for normal operation. If the switches are set differently, the instrument may not function correctly.

Key Lock Function

You can apply a lock to the functions of the Start, Stop, and user function keys. The lock prevents inadvertent execution of functions.

Connectors

The MW100 can come with the following connectors. The actually-installed connectors depend on the power supply input section specifications and options.

- Ethernet
- RS-422A/485 connector (/C3 option)
- RS-232 connector (/C2 option)
- CF card slot
- Power supply inlet (power supply input section specification: -1M)
- Power supply screw terminals (power supply input section specification: -1W, -2M, -3W)

Displays

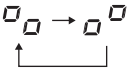
The MW100 indicates its operating conditions with the following displays.

- 7-segment LED
- Status indicators
- Communication status LED

7-Segment LED

Displays the MW100 Data Acquisition Unit's unit number, operation status, end of operation, and errors.

- Unit Number Display
  Unit numbers can be set from 00 to 89. 00 - 89 is displayed.
- Display of the Self-Test Operation on Startup
  When the power is turned ON the setting of dip switch 1 is displayed 00 followed by the operation preparation status 88. , and then a self check is performed. While the self check is in progress, the following displays are repeated.



- Key Lock Status
  A key lock function is included for preventing accidental manipulation of the MW100 front panel keys. The key lock status is indicated by a dot at the bottom of the unit number. The example shown is for a unit of number 00.

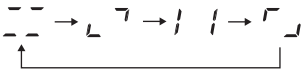
• Keylock release

Unit number

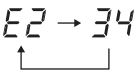
• Keylock

Unit number and dot

- In-Progress Display
  The following displays cycle while the CF card is being accessed or while calibration is being performed.



- Operation Error Display
  In error Exxx (where xxx is a three-digit number), the code is divided into two parts which are displayed alternately. In the first part, the letter E appears in the left digit with the hundreds digit of the error code to the right, and the second part consists of the last two digits of the error code.
  Example: Error code E234



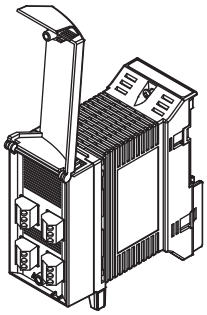
  Up to three error codes are saved.
  For the contents of error codes and their meanings, see section 4.1, "Errors Displayed on the 7-Segment LED and Corrective Actions." You can clear one error that is displayed by pressing the Stop key.

1.5 Input/Output Modules & Base Plate

Input/Output Modules

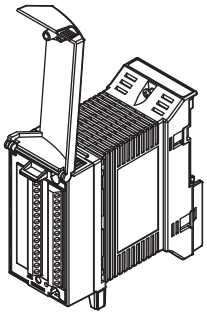
The following eleven types of modules are available. A screw terminal plate and separately installed screw terminal block (both sold separately) are available as accessories for the 10-CH Medium Speed Universal Input Module and the 10-CH High Speed Digital Input Module.

4-CH, High-Speed Universal Input Module (MX110-UNV-H04)



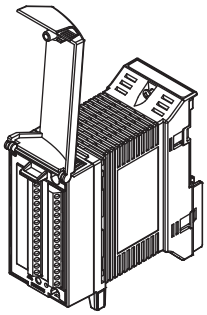
- **Minimum measurement interval: 10 ms (except 50 ms for temperature measurement**
- **Maximum number of inputs: 4 inputs**
- **Input types: DC voltage, TC, 3-wire RTD, and DI (LEVEL, contact)**

10-CH, Medium-Speed Universal Input Module (MX110-UNV-M10)



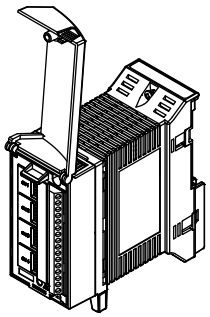
- **Minimum measurement interval: 100 ms**
- **Maximum number of inputs: 10 inputs**
- **Input types: DC voltage, TC, 3-wire RTD, and DI (LEVEL, contact)**

6-CH, Medium-Speed, Four-Wire RTD Resistance Input Module (MX110-V4R-M06)



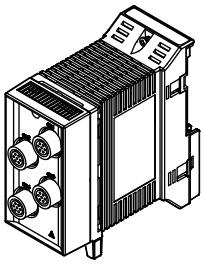
- **Minimum measurement interval: 100 ms**
- **Maximum number of inputs: 6 inputs**
- **Input types: DC voltage, 4-wire RTD, 4-wire resistance, and DI (LEVEL, contact)**

4-CH, Medium-Speed Strain Input Module (MX112-B12-M04 and MX112-B35-M04)



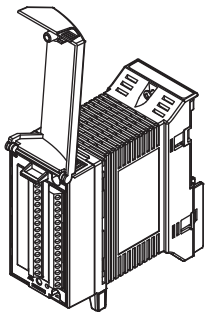
- Minimum measurement interval: 100 ms
- Maximum number of inputs: 4 inputs
- Input system: floating balanced input (isolation between channels)

4-CH, Medium-Speed Strain Input Module (MX112-NDI-M04)



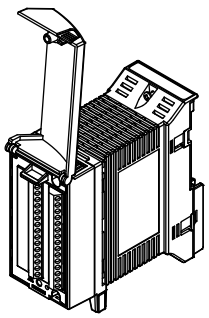
- Minimum measurement interval: 100 ms
- Maximum number of inputs: 4 inputs
- Input system: floating balanced input (non-isolation between channels)

10-CH, High-Speed Digital Input Module (MX115-D05-H10)



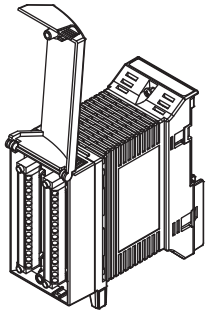
- Minimum measurement interval: 100 ms
- Maximum number of inputs: 10 inputs
- Input types: DI (non-voltage contact, open collector, 5-V logic)

10-CH, High-Speed Digital Input Module (MX115-D24-H10)



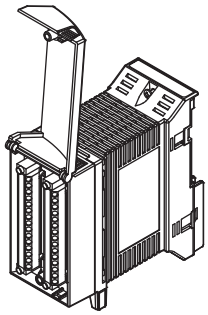
- Minimum measurement interval: 10 ms
- Maximum number of inputs: 10 inputs
- Input types: DI (24-V logic)

8-CH, Medium-Speed Analog Output Module (MX120-VAO-M08)



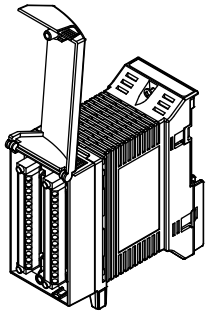
- **Output update interval: 100 ms (shortest)**
- **Maximum number of inputs: 8 outputs**
- **Output type: DC voltage, DC current**

8-CH, Medium-Speed PWM Output Module (MX120-PWM-M08)



- **Output update interval: 100 ms (shortest)**
- **Maximum number of inputs: 8 outputs**
- **Output type: PWM**

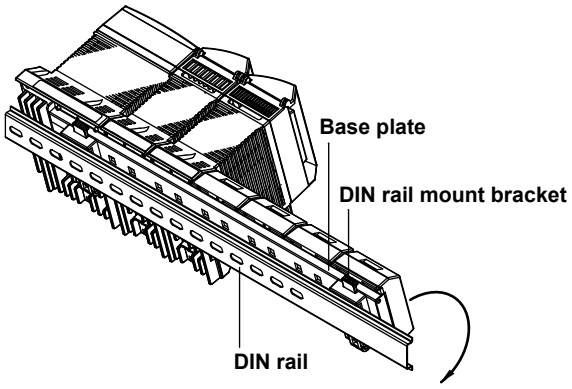
10-CH, Medium-Speed Digital Output Module (MX125-MKC-M10)



- **Output update interval: 100 ms (shortest)**
- **Maximum number of outputs: 10 outputs**
- **Output type: A contact (SPST)**

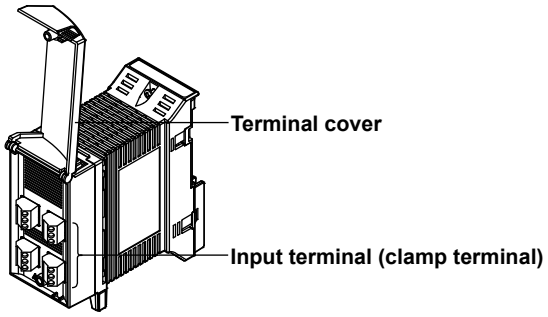
Base Plate

The base plate is equipped with connectors for connecting the main module and input/output modules. There are six types of base plates available (connecting from one to six input/output modules). By attaching DIN rail mounting brackets to the base plate, you can rack-mount or panel-mount the MW100 main unit.

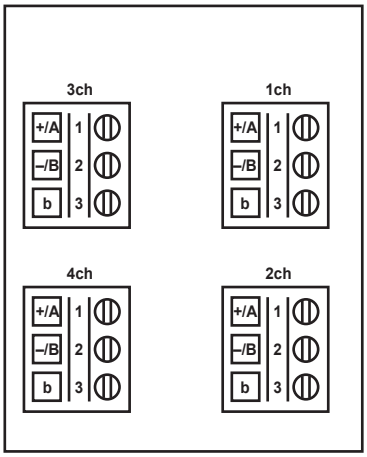


1.6 Functions of the 4-CH, High-Speed Universal Input Module

This module is equipped with four inputs and measures DC voltage, TC, RTD, and digital input (DI) at a minimum measurement interval of 10 ms (the minimum interval is 50 ms if the input type is thermocouple or RTD).
For details, see the user's manual (IM MX100-01E or IM MW100-01E).

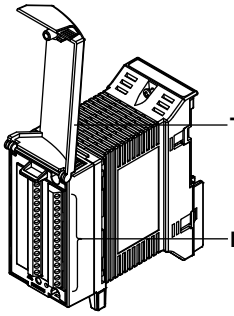


Terminal Assignments

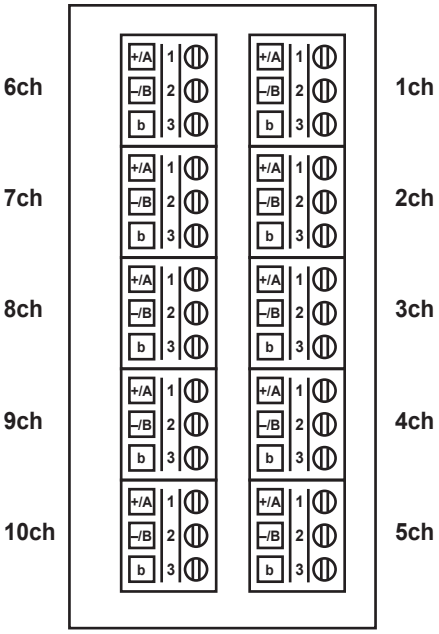


1.7 Functions of the 10-CH, Medium-Speed Universal Input Module

This module is equipped with ten inputs and measures DC voltage, TC, RTD, and digital input (DI) at a minimum measurement interval of 100 ms.
For details, see the user's manual (IM MX100-01E or IM MW100-01E).

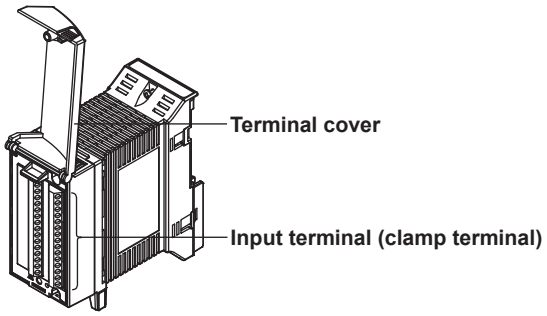


Terminal Assignments

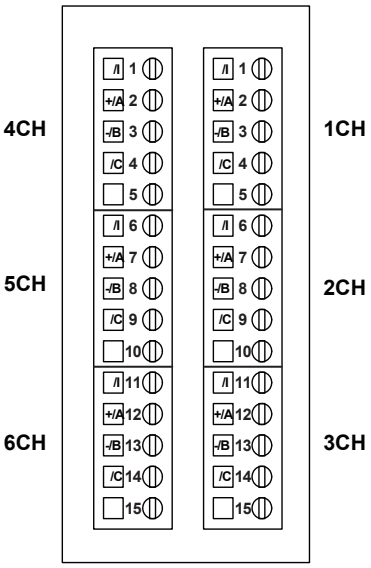


1.8 Functions of the 6-CH, Medium-Speed Four-Wire RTD Resistance Input Module

This module allows up to six inputs of DC voltage, thermocouple, 4-wire RTD, 4-wire resistance, and digital input (DI) at a minimum measurement interval of 100 ms.
For details, see the user's manual (IM MX100-01E or IM MW100-01E).



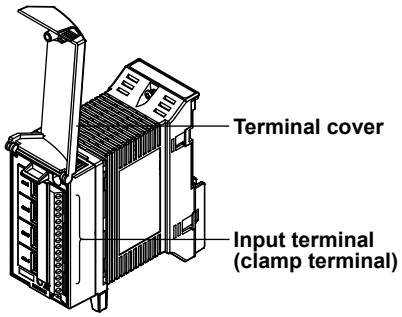
Terminal Assignments



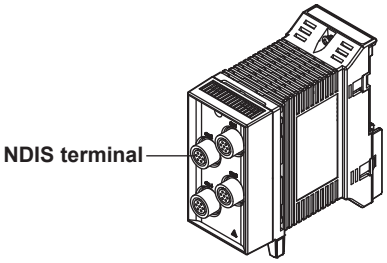
1.9 Functions of the 4-CH, Medium-Speed Strain Input Module

This module allows up to four inputs of measurement from strain gauges and strain gauge type sensors at a minimum measurement interval of 100 ms.
For details, see the user's manual (IM MX100-01E or IM MW100-01E).

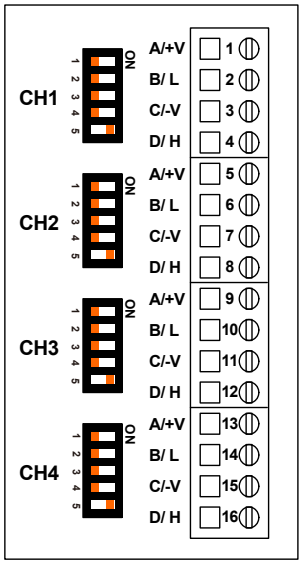
-B12, -B35



-NDI

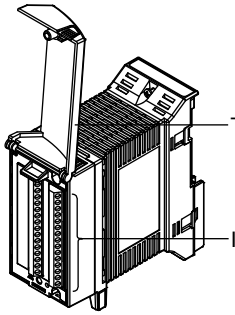


Terminal Assignments

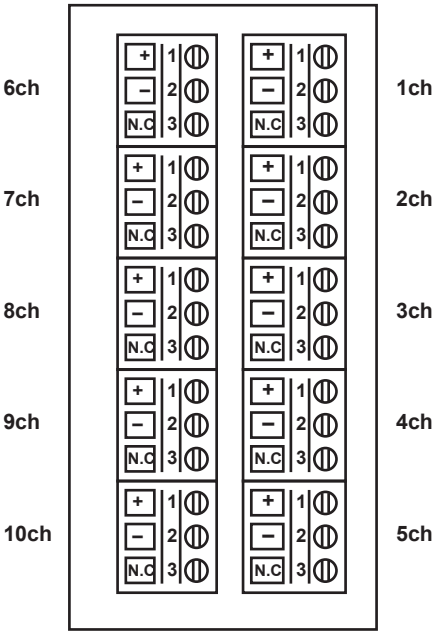


1.10 Functions of the 10-CH, High-Speed Digital Input Module

This module is equipped with ten inputs and measures 5-V logic, non-voltage contact, and open collector inputs at a minimum measurement interval of 10 ms.
For details, see the user's manual (IM MX100-01E or IM MW100-01E).

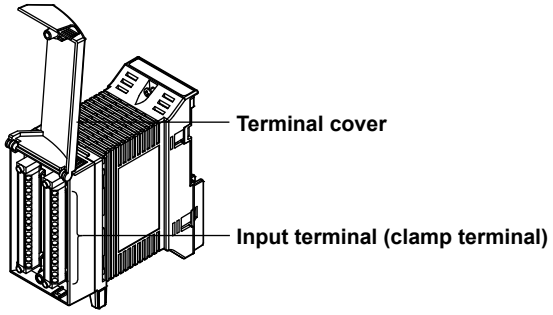


Terminal Assignments

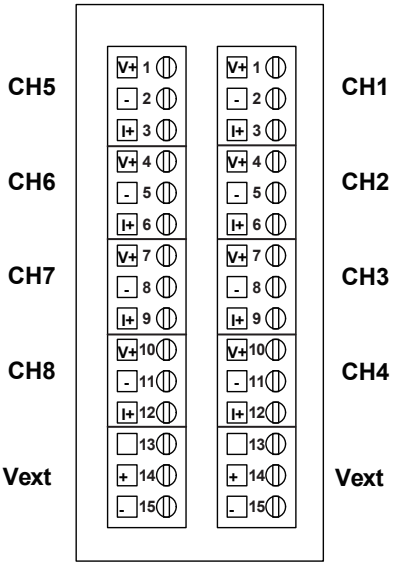


1.11 Functions of the 8-CH, Medium-Speed Analog Output Module

The module has eight outputs for voltage or current.
An external power source (24 V) is required for current output.
For voltage output only, an external power source is not required.
For details, see the user's manual (IM MX100-01E or IM MW100-01E).



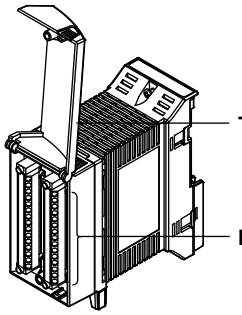
Terminal Assignments



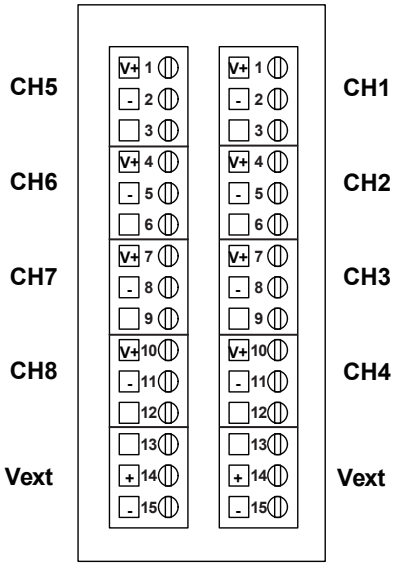
1.12 Functions of the 8-CH, Medium-Speed PWM Output Module

This module has eight outputs for pulse wave duty. A certain duty pulse waveform is output according to the specified pulse interval. A pulse interval can be set for each channel.

For details, see the user's manual (IM MX100-01E or IM MW100-01E).

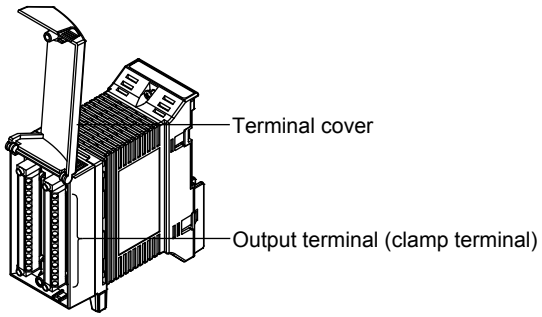


Terminal Assignments

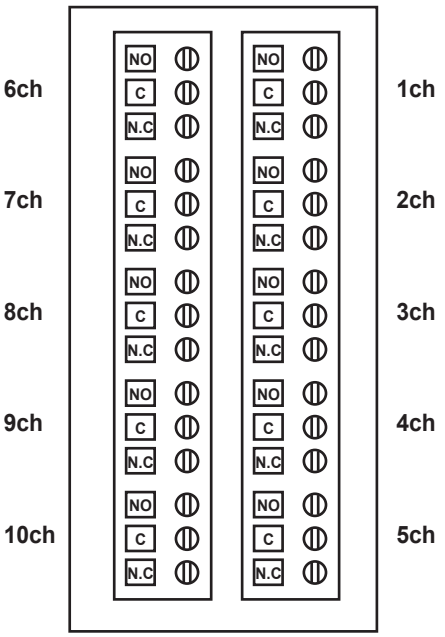


1.13 Functions of the 10-CH, Medium-Speed Digital Output Module

This module outputs 10 contact signals based on the alarm output settings and output settings on the PC software.
For details, see the user's manual (IM MX100-01E or IM MW100-01E).



Terminal Assignments



2.1 Introduction

Read the warning and cautions below before beginning tests.

WARNING

Circuit patterns of the printed circuit board are exposed. Be careful when handling so that hands or fingers are not injured by the protruding pins.

CAUTION

- Circuit patterns of the printed circuit board are exposed. If other metalic materials touch these patterns, electrical shorting will occur, causing the circuit to be damaged or burnt.
- It is sometimes necessary to turn the MX100/MX110/MX115/MX125/ MX150/772061/772063 upside down for adjustment. Do not drop the instrument, or allow it to fall over.

Test Environment

- Ambient temperature: 23 ± 5°C
- Relative humidity: 55 ± 20% (or 55 ±10% during MX100 tests)
- Atmospheric pressure: 86kPa–106kPa
- Power supply voltage: Nominal voltage ±1%
- Power supply frequency measurement: Nominal frequency ±1%
- Power supply waveform: Distortion factor of 5% or less
- DC power supply ripple: Content ratio of 0.1% or less
- Supply voltage source, supply voltage: Nominal supply voltage ±3%
- Supply voltage source, temperature: Ambient temperature of ± 2°C
- Supply voltage source, dew point: Lower than the ambient temperature by 10°C or more
- Supply voltage source, cleanliness level (oil, dust etc.): Less than 1 ppm of oil, with no dust particles exceeding 3 µm in diameter
- Vibration: A value having negligible effects on the instrument
- Position: Within ±3% of the specified position
- Interference*: A value that does not affect the measured results
- Electrical field: A value that does not affect the measured results
- Magnetic field: A value that does not affect the measured results
- Atmospheric pollutants: Levels of corrosive gasses, vapors, salts, and dust that do not affect the measured results.
- Free fall acceleration†: Acceleration during free fall as determined at a test site
- Other external effects‡: A value that does not affect the measured results

* Interference refers to common mode noise, series mode noise, power supply noise, and other phenomena in the signal line.

† If there is doubt about the exact gravity, you can use the standard value for free fall acceleration gn=9.80665 m/s^2 (an internationally agreed upon standard).

‡ Other external effects include luminance, draft, ultrasonic waves, and radiation.

2.2 Tests of the Main Module (MX100)

Tests

2.2.1 Protective Earth Continuity Test
2.2.2 Insulation Resistance Test
2.2.3 Withstanding Voltage Test
2.2.4 Voltage Frequency Detection Function
2.2.5 Battery Backup Function
2.2.6 Module Communication Function
2.2.7 LED Display Test
2.2.8 CF Card Test

Instruments Used

Instrument	Description
Insulation resistance tester	YOKOGAWA 2407 or equivalent A device that can measure 100 MΩ or more at 500 VDC
Withstanding voltage test	Kikusui TOS-9201 or equivalent A device that can measure 1.5 kVAC for 1 minute with a limit current of 10 mA
Earth continuity tester	Kikusui TOS-6200 or equivalent
AC stabilized power supply	A device capable of outputting AC100 V, and switching between 50 and 60 Hz
Input module or base plate (for test)	

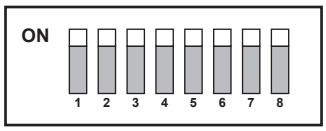
Before Testing

Initialize the memory before beginning any test. To initialize the memory, use the API for MX100/DARWIN (the MX190 application software), or perform the following procedure using the dip switches.

Procedure

1. Turn OFF the power to the MX100.
2. Set the dip switches as shown in the figure below. (Turn switch 5 OFF.)

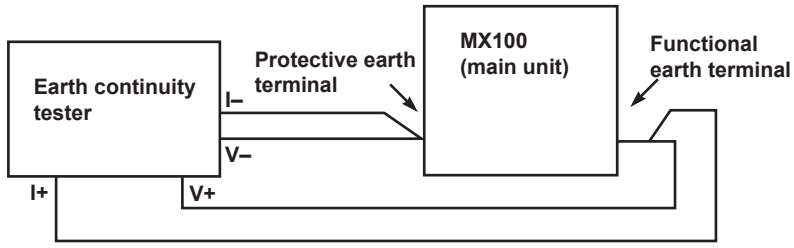
3. Turn ON the power to the MX100.
4. Check that bF is displayed on the 7-segment LED, then turn OFF the power to the MX100 again.
5. Set the dip switches as shown in the figure below (for normal operation, all switches are turned ON.)

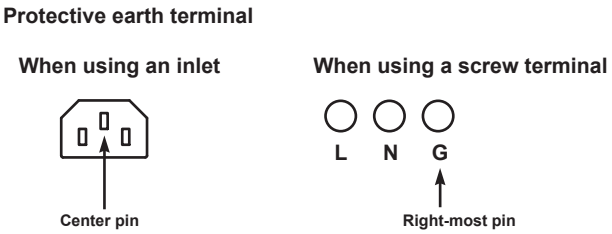


2.2.1 Protective Earth Continuity Test

Procedure

1. Wire the instruments as shown below.





2. Measure the resistance between the protective earth terminal and functional earth terminal. Use 4 wires for this measurement.

Items to Be Checked

That the resistance value does not exceed 0.1 Ω when tested at 60 Hz, 30 A for 10 seconds.

2.2.2 Insulation Resistance Test

Procedure

Perform a test using a DC 500 V insulation resistance tester and confirm that the following criteria are met.

Terminals Measured	Power Switch	Criteria
AC power terminal to functional earth termina* (Short between L and N)	ON	20 MΩ or higher
Ethernet input terminal to functional earth terminal (short all pins)	OFF	20 MΩ or higher

* You may use the functional earth terminal as a protective earth terminal.

2.2.3 Withstanding Voltage Test

Procedure

Perform the withstanding voltage test, and confirm that the following criteria are met and that no abnormalities occur.

Terminals Measured	Power Switch	Criteria
AC power terminal to functional earth terminal* (Short between L and N)	ON	1.5 kVAC for 1 minute Leakage current of 5 mA or less

* You may use the functional earth terminal as a protective earth terminal.

2.2.4 Voltage Frequency Detection Function

Procedure

If the power supply frequency is 50 Hz or 60 Hz, check the detected power supply frequency via Ethernet using calibration software (the API for MX100/DARWIN or the MX100 Standard Software). See the user's manuals for each software program for the operating procedures of those programs.

2.2.5 Battery Backup Function

Turn OFF the power to the MX100, then check whether the IP address was retained.

Procedure

1. Turn OFF the power to the MX100.
2. After at least 1 minute has elapsed, turn the power to the MX100 back ON again.
3. Confirm that the 7-segment LED reads 00.
4. Without changing any settings on the PC, check that communications can be performed via Ethernet in the same manner as before turning the power OFF in step 1.

2.2.6 Module Communication Function

Procedure

1. Connect one or more modules to the base plate, then connect the base plate to the MX100 main module.
2. Confirm that the modules are detected by the PC software.

2.2.7 LED Display Test

Procedure

1. Turn ON the power.
2. After completion of the self check and other procedures, confirm that 00 is displayed.
3. Confirm that the orange LED on the Ethernet connector illuminates when connected via Ethernet, and that the green LED blinks during communication.

2.2.8 CF Card Test

Procedure

1. Insert a CF card into the CF card slot on the MX100.
2. Press the access stop switch.
3. Remove the CF card, read the CF card on a PC, and confirm that an error log was recorded on the card.

   See the user's manual (IM MX100-01E) for information on how to remove the CF card.

2.3 Tests of the MW100 Main Module

Tests

2.3.1 Protective Ground Continuity Test
2.3.2 Insulation Resistance Test
2.3.3 Withstanding Voltage Test
2.3.4 Power Supply Frequency Detection Function
2.3.5 Battery Backup Function
2.3.6 Module Communication Function
2.3.7 Key Switch Test
2.3.8 Serial Communication Function (with Option /C2 or /C3 Only)

Instruments Used

Instrument	Description
Insulation resistance tester	YOKOGAWA 2407 or equivalent A device that can measure 100 MΩ or more at 500 VDC
Withstanding voltage tester	Kikusui TOS-9201 or equivalent A device that can measure 1.5 kVAC for 1 minute with a limit current of 10 mA
Earth continuity tester	Kikusui TOS-6200 or equivalent
AC stabilized power supply	A device capable of outputting AC100 V, and switching between 50 and 60 Hz
DC stabilized power supply	A device capable of outputting DC12–28 V with an output capacity of 30 W or more
Input module and base plate (for test)	
PC with Internet Explorer installed, capable of performing Ethernet or RS-232 communications	
RS-232/RS-422 converter or PC compatible RS422 communication module	
RS-232 cross cable	

Before Testing

Initialize the memory before beginning any test.
To initialize the memory, use the dip switches according to the following procedure.

Procedures

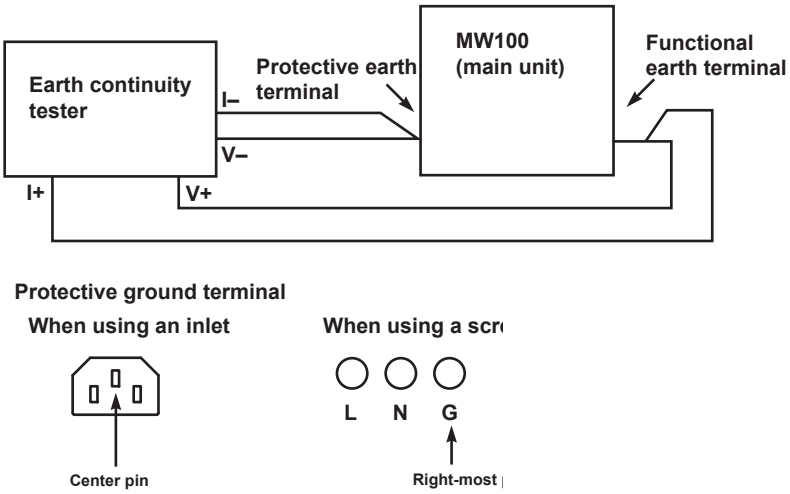
1. Turn OFF the power to the MW100.
2. Set the dip switches as shown in the figure below. (Turn SW5 OFF.)

3. Turn ON the power to the MW100.
4. Check that bF is displayed on the 7-segment LED, then turn OFF the power to the MW100 again.
5. Set the dip switches as shown in the figure below. (For normal operation, all switches are turned ON.)

2.3.1 Protective Ground Continuity Test

Procedure

1. Wire the instruments as shown below.



2. Measure the resistance between the protective ground terminal and functional ground terminal. Use 4 wires for this measurement.
   Items to Be Checked
   That the resistance value does not exceed 0.1 Ω when tested at 60 Hz, 30 A for 10 seconds.

2.3.2 Insulating Resistance Test

Procedure

Perform a test using a DC 500 V insulation resistance tester and confirm that the following criteria are met.

Terminals Measured	Power Switch	Criteria
Power terminal to functional ground terminal*	ON	20 MΩ or higher
MW100 AC power supply specifications (short between L and N)		
MW100 DC power supply specifications (short +)		

* You may use the functional ground terminal as a protective ground terminal.

2.3.3 Withstanding Voltage Test

Procedure

Perform the withstanding voltage test, and confirm that the following criteria are met and that no abnormalities occur.

Terminals Measured	Power Switch	Criteria
AC power supply terminal to functional ground terminal*	ON	1.5 kVAC for 1 minute
MW100 AC power supply specifications (short between L and N)	Leakage current of 5 mA or less	
MW100 DC power supply specifications (short +)		

* You may use the functional ground terminal as a protective ground terminal.

2.3.4 Power Supply Frequency Detection Function Test

Procedure

Use a communication command (ASCII command, port number 34318) via Ethernet, to check whether the detected power supply frequency is 50 Hz or 60 Hz.

2.3.5 Battery Backup Function

Turn OFF the power to the MW100, then check whether the IP address was retained.

Procedure

1. Turn OFF the power to the MW100.
2. After at least 1 minute has elapsed, turn the power to the MX100 back ON again.
3. Without changing any settings on the PC, check that communications can be performed via Ethernet in the same manner as before turning the power OFF in step 1.

2.3.6 Module Communication Function

Procedure

1. Connect one or more modules to the base plate, then connect the base plate to the MW100 main module.
2. Confirm that the modules can be detected with communciation commands (ASCII commands, such as RS 0 or CF 0).

2.3.7 LED Display Test

Procedure

1. Turn ON the power.
2. After completion of the self check and other procedures, confirm that 00 is displayed (if the unit number is set to 0).

   Confirm that the 7-segment LED contains no defective segments.

2.3.8 Serial Communication Function Test (with Option /C2 or /C3 Only)

Procedure

1. Connect the PC to the MW100 using a serial communication cable or RS232/RS422 converter. Send an arbitrary command from the PC to the MW100 and confirm that the expected result occurrs.

2.4 Tests of the 4-CH, High-Speed Universal Input Module (MX110-UNV-H04)

Tests

2.4.1 Insulation Resistance Test
2.4.2 Withstanding Voltage Test
2.4.3 Excessive Input Test
2.4.4 Measurement Accuracy Test
2.4.5 Burnout Test
2.4.6 Reference Junction Compensation Accuracy Test

Instruments Used

Instrument	Standards, Recommended Products Etc.
MX100, MW100, or equivalent	MX100 or MW100 Main Module MX150 Base Plate
PC*	Includes software required for testing
DC voltage generator	M/9000†, ‡
DMM	HP3458A or equivalent§ DCV accuracy: 0.005% of rdg + 1µV Resistance: 0.005% of rdg + 1 mΩ
Rheostat	ADR-1202‖, #
Insulation resistance tester	DC500 V
Withstanding voltage tester	AC 2 kV–4 kV
Temperature tank standardized at 0°C	Coper Electronics ZC-114 or equivalent 0±0.01°C

* Ensure that the environment is one in which module settings and measured values can be read in.

† Ensure that the DC voltage generator meets the standards below.
However, even if it meets the standards, voltage drops can occur as a result of output impedance, so the output voltage should always be monitored with a DMM.

Output voltage	Standard
0 V	±1 µV (short to obtain)
20 mV	±100 ppm
60 mV	±80 ppm
200 mV	±60 ppm
1 V	±60 ppm
2 V	±60 ppm
6 V	±60 ppm
20 V	±60 ppm
100 V	±60 ppm

‡ When using an M/9000, you can obtain 0 V by shorting, and output other than 0 V can be onitored using a DMM.

§ The HP3458A is used for signal source monitoring.

‖ Ensure that the rheostat meets the following standards.

Output Resistance	Standard
0 Ω	± 1 mΩ (short to obtain)
Other than 0 Ω	±(0.006% of Setting + 2 mΩ)

0 Ω cannot be output from the ADR-1202, so short to obtain (0.2 Ω min).
Output resistance values other than 0 Ω meet the specification of the ADR-1202, but with the objective of monitoring the effects of aging, the output resistance must be adjusted.

2.4.1 Insulation Resistance Test

For this test, the Four-Channel, High-Speed Universal Input Module is installed with the MX100, MW100, or equivalent. Perform this test before the test described in section 2.4.2, “Withstanding Voltage Test.”

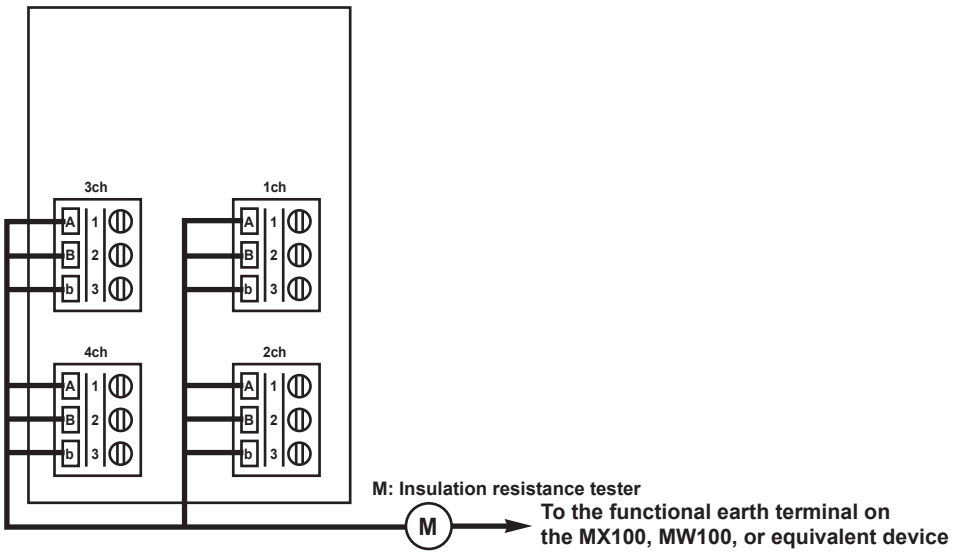
procedure

Wire the instrument as shown in the figure below, measure insulation resistance, then confirm that the results meet the criteria below.

Measured Item	Criteria
Input terminal to earth terminal	DC500 V, 10 MΩ or more
Between input terminals	DC500 V, 20 MΩ or more

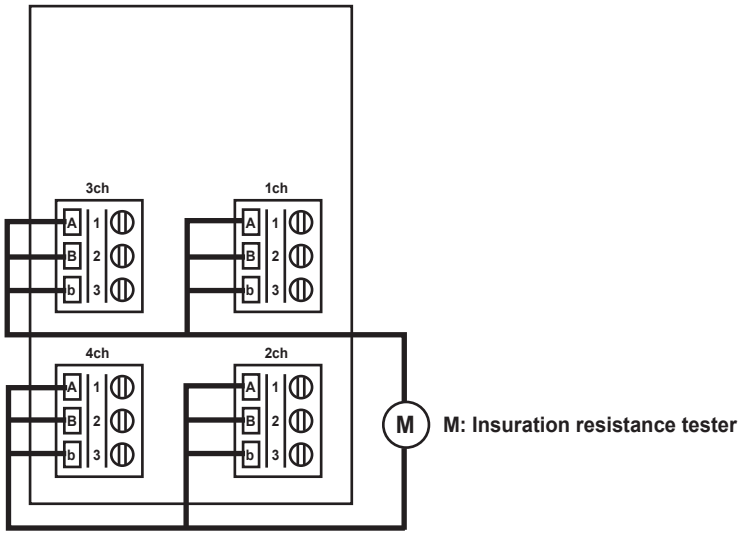
Measurement between Input Terminal and Earth Terminal

Short all terminals A, B, and b (1-3) on channels 1 through 4, then measure the insulation resistance between the MX100/MW100’s or equivalent device’s functional earth terminals. Be sure to attach the module and base plate when performing this test.



Measurement between Input Terminals

Measure the insulation resistance between a device whose terminals A, B, and b (1-3) on channels 1 and 3 are all shorted and a device whose terminals A, B, and b (1-3) on channels 2 and 4 are all shorted.



2.4.2 Withstanding Voltage Test

For this test, the Four-Channel, High-Speed Universal Input Module is installed with the MX100, MW100, or equivalent device. Perform this test after the test described in section 2.4.1, “Insulation Resistance Test.”

Procedure

Perform the withstanding voltage test on the same locations indicated for the insulation resistance test (input terminal to earth, and between input terminals), then confirm that the results meet the criteria below.
Be sure to attach the module and base plate when performing this test.

Measured Item	Criteria
Input terminal to earth terminal	AC3700 Vrms for 1 minute, with leakage of 2 mA or less
Between input terminals	AC2300 Vrms for 1 minute, with leakage of 1 mA or less

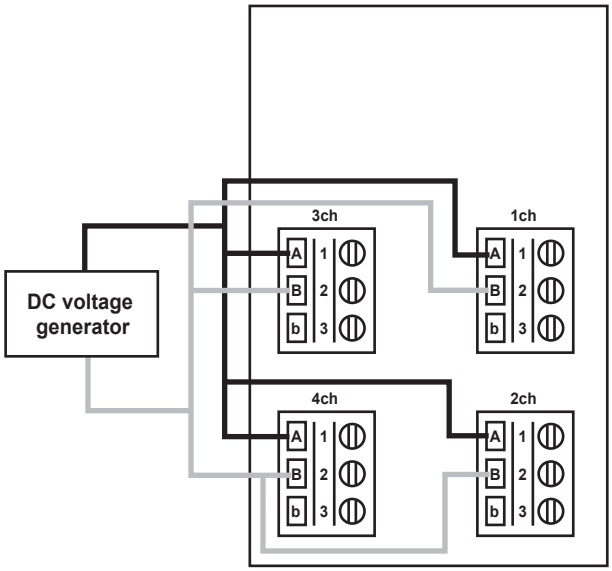
2.4.3 Excessive Input Test

Perform this test while in measurement mode.
Set the measurement interval to an arbitrary value greater than 50 ms.

Procedure

Set the range for all channels to DC20 mV.

1. Connect all A (1) and B (2) terminals separately on channels 1 through 4 as shown in the figure below.



2. Apply the voltages below between the A and B terminals, and confirm that no abnormalities occur.

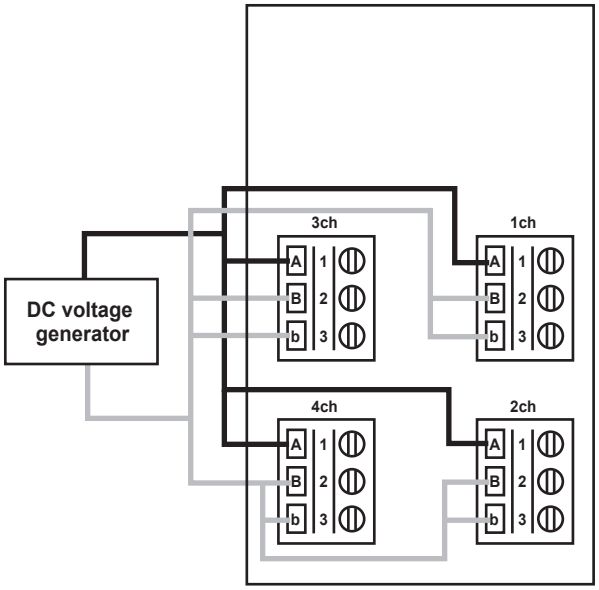
Note

In the same manner as described in “Setting All Channels to Pt100/1 mA High Resolution Range” below, connect terminals B and b (2, 3) then perform the excessive input test.

Applied Voltage	Duration
+20 V	10 seconds
-20 V	10 seconds

Setting All Channels to Pt100/1 mA High Resolution Range

1. Connect all A (1) and B, b (2, 2) terminals separately on channels 1 through 4 as shown in the figure below.



2. Apply the voltages below between the A-B and b (1, 2, 3) terminals, and confirm that no abnormalities occur.

Applied Voltage	Duration
+10 V	1 minute
-10 V	1 minute

2.4.4 Measurement Accuracy Test

For this test, the Four-Channel, High-Speed Universal Input Module is installed with the MX100, MW100, or equivalent device.

Test Conditions

- After calibration, if you do not turn OFF the power, even if you perform measurement correctly the calibration data may not be recorded accurately. Therefore, after calibration you must turn OFF the power at least once before performing the test.
- Allow the instrument to warm up for 10 minutes at an ambient temperature of 23±5°C and relative humidity of 55 ±20% before performing the test.

Procedure

The MX110-UNV-H04 has a separate AD for each channel, so the measurement accuracy of each channel (1 through 4) must be confirmed.

1. Since product specifications vary depending on the measurement interval, the measurement accuracy test must be performed at the following two intervals.

Measurement Interval	Measuring Range
10 ms	DCV Range
50 ms	DCV, RTD Rage

2. Confirm that the following product specifications are met (assuming measurement of 20 data or more).

Measurement interval of 10 ms

Measuring Range	Input Value	Specification
2 V	+2.0000 V	±(0.1% of rdg + 10 digits)
	0.0000 V	
	-2.0000 V	

Measurement Interval of 50 ms

Measuring Range	Input Value	Specification
20 mV	+20.000 mV 0.000 mV -20.000 mV	±(0.05% of rdg + 5 digits)
60 mV	+60.00 mV 0.00 mV -60.00 V	±(0.05% of rdg + 2 digits)
200 mV	+200.00 mV 0.00 mV -200.00 mV	±(0.05% of rdg + 2 digits)
2 V	+2.0000 V 0.00 mV -2.0000 V	±(0.05% of rdg + 5 digits)
6 V	+6.000 V 0.00 mV -6.000 V	±(0.05% of rdg + 2 digits)
20 V	+20.000 V 0.000 V -20.000 V	±(0.05% of rdg + 2 digits)
100 V	+100.00 V 0.000 V -100.00 V	±(0.05% of rdg + 2 digits)
Pt100/1 mA High resolution	43.88 Ω/-140.00°C 100.00 Ω/0.00°C 157.33 Ω/+150.00°C	±(0.05% of rdg + 0.3°C)
Pt100/1 mA	18.52 Ω/-200.0°C 100.00 Ω/0.0°C 313.71 Ω/+600.0°C	±(0.05% of rdg + 0.3°C)
Cu10 G.E. high resolution/2 mA	1.326 Ω/-200.0°C 9.036 Ω/0.0°C 20.601 Ω/+300°C	±(0.1% of rdg + 0.7°C)
Cu10G.E./2 mA	9.036 Ω/0.0°C	±(0.1% of rdg + 0.7°C)
J263B /2 mA	109.408 Ω/300K	±(0.05% of rdg + 0.3 K)
Pt100 high stability /2 mA	18.52 Ω/-200.0°C 10.00 Ω/0.0°C 194.10 Ω/+250.0°C	±(0.05% of rdg + 0.3°C)

2.4.5 Burnout

For this test, the Four-Channel, High-Speed Universal Input Module is installed with the MX100, MW100, or equivalent device.

Test Conditions

- Set Burnout to UP or DOWN, and ready the instrument for measurement before performing the test.
- If Burnout is set to OFF, perform the test at 1 MΩ.

Procedure

1. Connect the resistances below between A and B (1-2) on channels 1 through 3, then confirm that the criteria are met.

Resistance	Measuring Range	Criteria
22 kΩ	Type-K	That the measured value does not max out
1 MΩ	Type-K	That an overrange or burnout is detected

   The MX110-UNV-H04 has a separate AD for each channel, so the burnout operation on each channel (1 through 4) must be confirmed.

   Do this when burnout is set to both UP and DOWN.

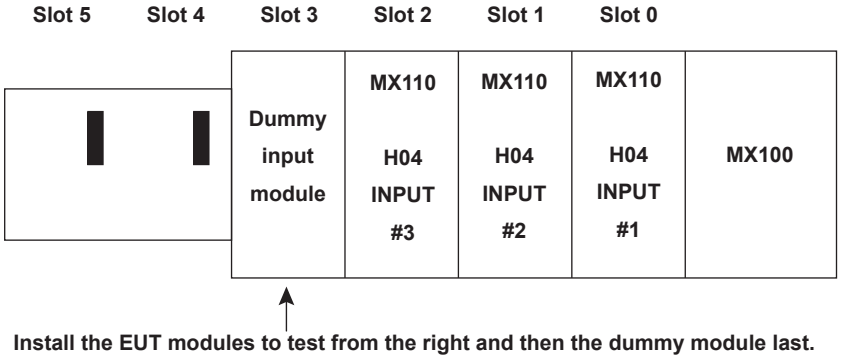
2. After confirmation of the burnout operation, turn the burnout setting OFF.
3. Confirm that the measured values do not max out when the above resistances are connected.

2.4.6 Reference Junction Compensation Accuracy

Cautions When Performing This Test

- The test module uses slots number 0 through 4. A dummy input module (MX110 H04 INPUT MODULE or equivalent) is installed into slot 5.
  When performing a test using fewer than 5 modules, install the modules into contiguous slots starting with slot 0, with the dummy input module installed in the last slot. The dummy input module is installed simulate common installation conditions for its neighboring module.

Example: when testing 3 modules at once



Install the EUT modules to test from the right and then the dummy module last.
Use another MX110-UNV-H04 as the dummy.

- Using a calibrated thermocouple (Type-T), confirm that the criteria are met when factoring in the calibration value.
- Monitor the 0°C standardized temperature tank, confirming that it stays at 0±0.01°C. If the temperature tank is off, confirm that the difference is within the allowable range.
- When using a zero-controlled device, the tip of the thermocouple floats 5-10 mm off the bottom. However, that distance varies depending on the model. Please see the user's manual.
- Perform the test in a stable environment. If drafts are present, position the equipment to avoid them.
- Allow the instruments to warm up for at least 30 minutes before performing the test. Note that you must wait at least 15 minutes after wiring the thermocouple.
- Always use terminal covers.
- If the measured values are questionable, record 50 to 100 data, then make a determination based on the average or median value.
- The MX110-UNV-H04 modules have a separate RJC for each channel, so the criteria must be met on each channel (1 through 4).
- Measurement fluctuation errors must be prevented as much as possible by adopting the following setting conditions.
  Measurement interval: 100 ms; Filter: 0
- Confirm that the fluctuation among 50 data meets the criterion.
  Criterion: 0.2°C or less

  If the test results do not meet the criteria, reconfirm the items above.

Procedure

Perform measurement using the Type-T thermocouple at 0°C.
Confirm that the measured values meet the criterion.
  Criterion: 0±0.4°C or less

Causes of Failure

If the test results do not meet the criteria, the following causes may apply.

- Faulty RJC board connection
- Defective RJC board (B8720TH)

2.5 Tests of the 10-CH, Medium-Speed Universal Input Module (MX110-UNV-H10)

Tests

2.5.1 Insulation Resistance Test
2.5.2 Withstanding Voltage Test
2.5.3 Excessive Input Test
2.5.4 ID Check
2.5.5 Measurement Accuracy Test
2.5.6 Between-Channel Error Test
2.5.7 Burnout Test
2.5.8 Reference Junction Compensation Accuracy Test

Instruments Used

Instrument	Standards, Recommended Products Etc.
MX100, MW100, or equivalent	A device that can connect with and perform communications with the MX110 10-ch Medium-Speed Universal Input Module (Ex. MX100 + MX150 or MW100 + MX150) MX150 Base Plate
Front TR Assembly (When with the /NC option)	Product number: B8720BE A device that can receive input independently on each channel
Screw Term Assembly & Cable	Product number: B8720BH Used to confirm the ID setting. If the ID is correct, a device with an altered connector or the like can be substituted.
PC‡	A device that can perform communication with the MX100/M\W100 or equivalent instrument
DC voltage generator	FLUKE 5520A* or equivalent Accuracy: 0.005% of setting + 1mV A device capable of 100 V output or higher
Rheostat	ALPHA ADR-1202† or equivalent Accuracy: 0.005% of setting + 2 mΩ A device with resolution of 1 mΩ or less
DMM	Agilent 3458A or equivalent Voltage: 0.005% of rdg + 1mV Resistance: 0.01% of rdg + 1 mΩ
Insulation resistance tester	DC500 V
Withstanding voltage tester	AC 1 kV–4 kV
Temperature tank standardized at 0°C	Coper Electronics ZC-114 or equivalent 0±0.01°C

* If a DC voltage generator meeting the standards above is not available, you can ensure that the stated voltage is output by substituting a FLUKE 9100 or equivalent and monitoring the output voltage using a DMM. Also, due to the output impedance, some voltage generators cannot output all stated voltages, and at 0 V, there are many cases where the above standard is not met, so 0 V can be obtained by shorting the terminals. It is recommended to monitor when set to DOWN.

† Measure the setting value and actual output value, then confirm that the above standards are met.
0.2 Ω or less cannot be set on the ADR-1202, so 0 Ω can be achieved by shorting the terminals.

‡ Ensure that the module settings and measured values can be read in.

2.5.1 Insulation Resistance Test

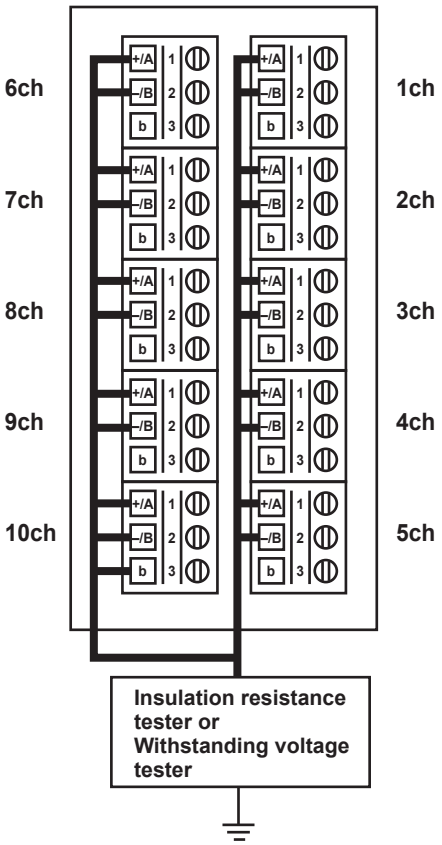
Attach the MX110 10-ch Medium-Speed Universal Input Module to the MX100, MW100, or equivalent before performing this test.

Procedure

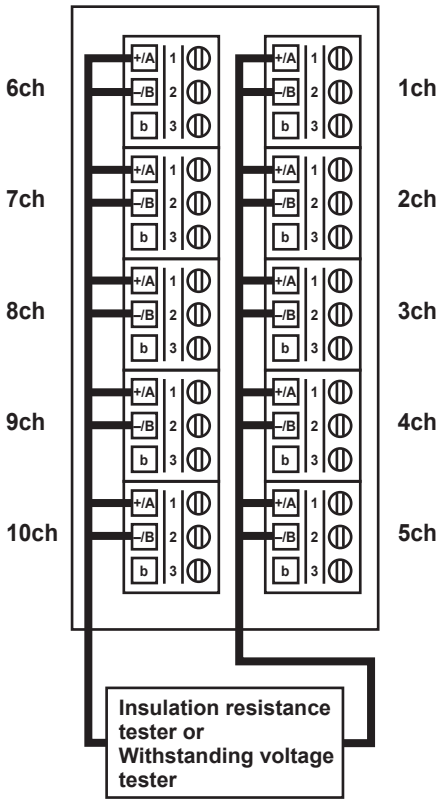
Wire the instrument as shown in the figure below, measure insulation resistance, then confirm that the results meet the criteria below.

Measured Item	Criteria
Input terminal to earth terminal on the MX100, MW100, or equivalent	20 MΩ or more (at DCV 500 V)
Between input terminals	20 MΩ or more (at DCV 500 V)

Between the input terminal and earth terminal on the MX100 or equivalent



Between input terminals



2.5.2 Withstanding Voltage Test

Attach the 10-ch Medium-Speed Universal Input Module to the MX100, MW100, or equivalent before performing this test.

Procedure

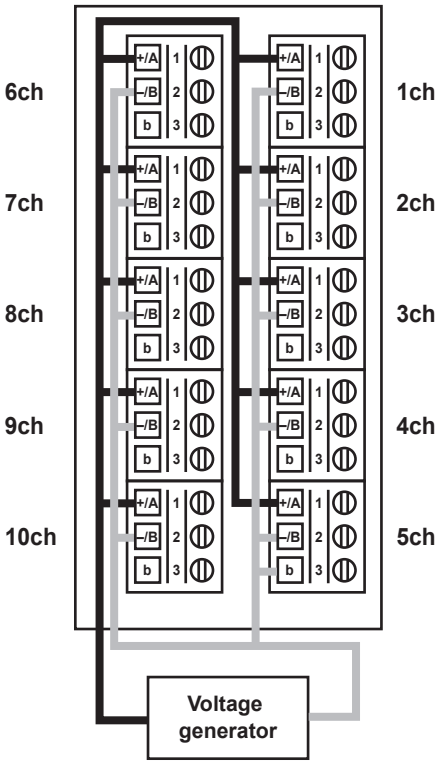
Wire the instrument in the same manner as in section 2.5.2, “Withstanding Voltage Test,” then confirm that the results meet the criteria below.
With the withstanding voltage test, in order to ensure continuity from the MX100 or equivalent’s earth to the module’s heat sink, install the B8720BB onto the base plate and fasten with screws.

Measured Item	Criteria
Input terminal to earth terminal on the MX100, MW100, or equivalent	Current leakage of 2 mA or less at 3700 Vrms AC for 1 minute
Between input terminals	Current leakage of 1 mA or less at 1000 Vrms AC for 1 minute

2.5.3 Excessive Input Test

Procedure

1. Connect the H(A/+) side and L(B/-) side terminals separately on all channels.



2. Set all channels to 20 mV.
3. Input ±20 V between the H and L/b sides for 10 seconds each, and confirm that no abnormalities* occur.
4. Set all channels to the “Cu10 GE High Stability” range.
5. Input ±10 V between the H and L/b sides for 1 minute, and confirm that no abnormalities* occur.

* Abnormalities refers to excessive current or emissions of light or smoke.

Note

This test can be performed during warm-up.

2.5.4 ID Check

This test confirms whether the module and terminal board types are correctly identified when module information is obtained from the MX100, MW100, or equivalent.

Procedure

Terminal boards B8720BE through B8720BH are exchanged one by one, and the ID is confirmed each time a new board is installed.

When exchanging a terminal board, you must make sure that the power to the MX100, MW100, or equivalent is turned OFF. If the OFF/ON cycle is not performed, the ID information is not updated.

2.5.5 Measurement Accuracy Test

Procedure

1. Turn the power ON then OFF.
2. Turn the power ON again, then allow the instrument to warm up for at least 10 minutes.
3. Adjust so that the wires connected to the A, B, and b terminals have the same resistance value.

   Set channel 2 as the measurement channel, and the measurement interval and duration as follows:

Measurement Interval	Duration
100 ms	5 seconds or more
500 ms	10 seconds or more

4. Confirm that the measured results are within the judgment criteria range in the chart below.

100 ms Interval

Range	Input	Specifications
2 V	+2.0000 V 0.0000 V -2.0000 V	±(0.1% of rdg. + 10 digits)

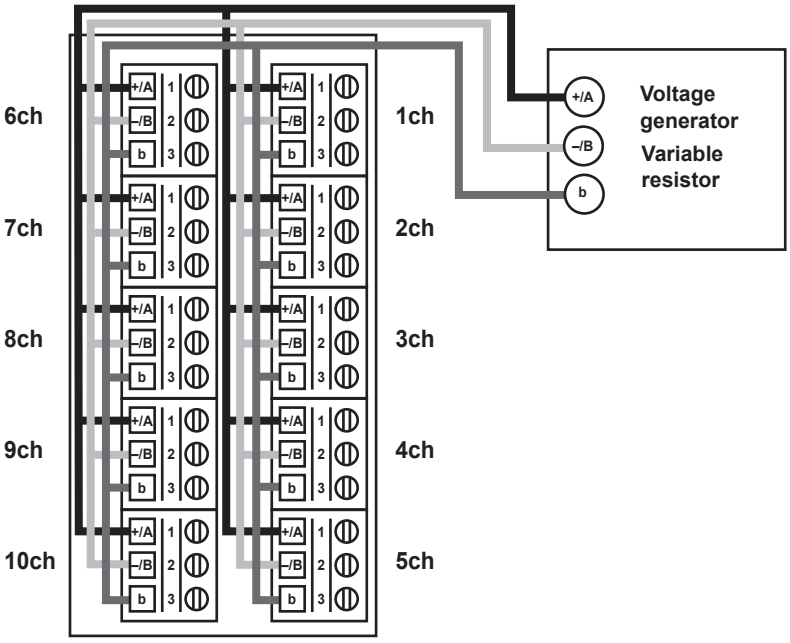
500 ms Interval

Range	Input	Specifications
20 mV	+2.0000 V 0.000 mV -20.000 mV	±(0.05% of rdg. + 5 digits)
60 mV	+60.00 mV 0.00 mV -60.00 V	±(0.05% of rdg + 2 digits)
200 mV	+200.00 mV 0.00 mV -200.00 mV	±(0.05% of rdg + 2 digits)
2 V	+2.0000 V 0.0000 V -2.0000 V	±(0.05% of rdg + 5 digits)
6 V	+6.000 V 0.000 V -6.000 V	±(0.05% of rdg + 2 digits)
20 V	+20.000 V 0.000 V -20.000 V	±(0.05% of rdg + 2 digits)
100 V	+100.00 V 0.00 V -100.00 V	±(0.05% of rdg + 2 digits)
Pt100	18.52 Ω/-200.0°C 100.00 Ω/0.0°C 313.71 Ω/+600.0°C	±(0.05% of rdg + 0.3°C)
Cu10 GE	9.036 Ω/-0.0°C	±(0.1% of rdg + 2°C)
Pt100 High Resolution	100.00 Ω/0.00°C 157.33 Ω/150.00°C	±(0.05% of rdg + 0.3°C)
Cu10 GE	1.326 Ω/-200.0°C	±(0.1% of rdg + 2°C)
High Resolution	9.036 Ω/0.0°C 20.601 Ω/+300.0°C	

2.5.6 Between-Channel Error Test

Procedure

1. Connect the H(A/+) side and L(B/-) side on all channels as shown in the figure below.
   When connecting, do not bundle the wires on the input terminal side, but rather near the voltage generator or resistor. Also, ensure that the resistance vales of all three wires connected to each channel are equal. Otherwise, measurement errors will occur.



2. Confirm that the between-channel error vales are less than the criteria given below.

Range	Input	Criteria
20 mV	Short input H to L	0.000 mV ± 4 digits
Cu10 GE	9.036 Ω	Between-channel dispersion: 1.2°C Measured value: 0±1.6°C (all channels)

2.5.7 Burnout Test

Procedure

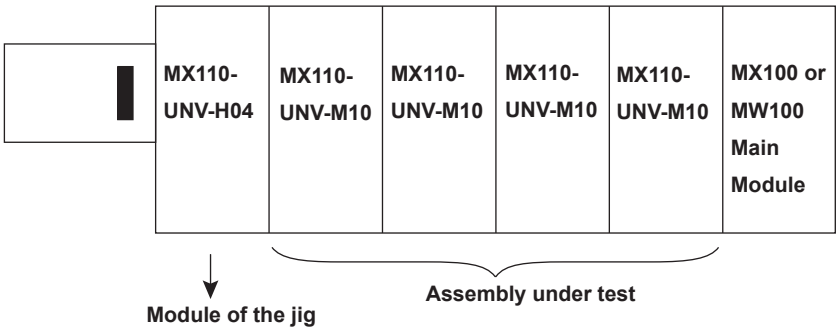
1. Connect 2 kΩ and (200 kΩ + 0.22 µF) pararel junction between H(A/+) and L(B/-) on any two channels.
2. Enter the following measurement ranges on the MX100/MW100.
   Type-K thermocouple
   Burnout ON
3. Confirm that the measured results match the table below.
4. Set the measurement range to “B/O OFF,” and confirm that the measured values do not max out.
5. Remove the 2 kΩ resistor in step 1, and connect a load (200 kΩ + 0.22 µF) in parallel.
6. Enter the following measurement range on the MX100/MW100.
   Type-K thermocouple
   Burnout ON
7. Confirm that the measured results match the list below.
8. Set the measurement range to “B/O OFF” and confirm that the measured values do not max out.

Connected Load	**Measured Result**
2 kΩ	Near Room Temperature
200 kΩ + 0.22 µF wired in parallel	Detection of an overrange or burnout

2.5.8 Reference Junction Compensation Accuracy Test

Cautions When Performing This Test

- Multiple modules can be tested simultaneously during this test. When connecting multiple modules to the MX100/MW100, install the modules contiguously starting from the right side as shown in the figure below. Also, when installing fewer than 6 modules (fewer than the number of modules that can be installed on the MX150), install the MX110-H04 (High Speed Input Module) to the left of the modules being tested.



- Use a calibrated thermocouple (Type-T), preferably one with wires of a diameter less than 0.5 mm, and with no terminal tip.
- Monitor the 0°C standardized temperature tank, confirming that it stays at 0±0.01°C. If the temperature tank is off, confirm that the difference is within the allowable range.
- When using a zero-controlled device, the tip of the thermocouple floats 5-10 mm off the bottom. However, that distance varies depending on the model. Please see the user's manual.
- Perform the test in a stable environment. If drafts are present, position the equipment to avoid them.
- Allow the instruments to warm up for at least 30 minutes before performing the test. Note that you must wait at least 15 minutes after wiring the thermocouple.
- After connecting the thermocouple, be sure to attach the terminal cover.
- If the measured values are questionable, record 50 to 100 data, then make a determination based on the average or median value.
- Set it up so that only measurement channel 4 is required. In this case, the criteria are as follows:

  4 CH criteria: -0.3–0.3°C

  If the test results do not meet the criteria, reconfirm the items above.

Procedure

Perform measurement using the Type-T thermocouple at 0°C.

1. Set the measurement interval and filter as follows:
   Measurement interval: 1 s
   Filter: 0
2. Confirm that the measured values on all channels meet the criteria given below.
3. Confirm that the fluctuation when 50 data or more are measured is less than the criterion below.
   Measurement criterion: 0±0.4°C or less
   Fluctuation criterion: 0.2°C or less

2.6 Tests of the 6-CH, Medium-Speed Four-Wire RTD Resistance Input Module (MX110-V4R-M06)

Tests

2.6.1 Insulation Resistance Test
2.6.2 Withstanding Voltage Test
2.6.3 Excessive Input Test
2.6.4 ID Check
2.6.5 Measurement Accuracy Test
2.6.6 Between-Channel Error Test
2.6.7 DI Contact Input Test

Instruments Used

Instrument	Standards, Recommended Products etc.
MX100, MW100, or equivalent	A device that can connect to and perform communications with the MX110 6-CH Medium-Speed Four-wire RTD Resistance Input Module (Ex. MX100 + MX150, or MW100 + MX150) MX150 Base Plate
PC‡	A device capable of Ethernet communication with the MX100, MW100, or equivalent
DC voltage generator	FLUKE 5520A* or equivalent Accuracy of ±0.005% of setting + 1 V A device capable of output of 100 V or more
Variable resistor	ALPHA ADR-3204G† or equivalent Accuracy of except for 0 Ω: ±0.006% of setting + 2 mΩ A device with resolution of 1 mΩ or less
DMM	Agilent 3458A or equivalent Voltage: 0.005% of rdg + 1 V Resistance: 0.005% of rdg + 1 mΩ
Insulation resistance tester	DC500 V
Withstanding voltage tester	AC 1 kV–4 kV
0°C standardized temperature tank	Coper Electronics ZC114 or equivalent 0 ±0.01°C

* If a DC voltage generator of the above standard is not available, you can ensure that the stated voltage is output by substituting a FLUKE 9100 or equivalent and monitoring the output voltage with a DMM. Also, due to the output impedance, some voltage generators cannot output all stated voltages, and at 0 V, there are many cases where the above standard is not met, so 0 V can be obtained by shorting the terminals. It is recommended to monitor when set to DOWN.

† Measure the setting value and actual output value, then confirm that the above standards are met.
0.2 Ω or less cannot be set on the ADR-3204G, so 0 Ω can be achieved by shorting the terminals.

‡ Ensure that the module settings and measured values can be read in.

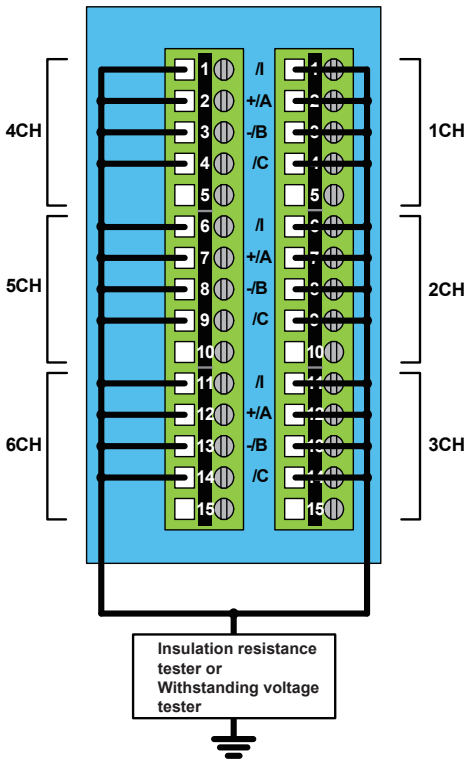
2.6.1 Insulation Resistance Test

Attach the MX110 6-CH Medium-Speed Four-Wire RTD Resistance Input Module to the MX100, MW100, or equivalent before performing this test.

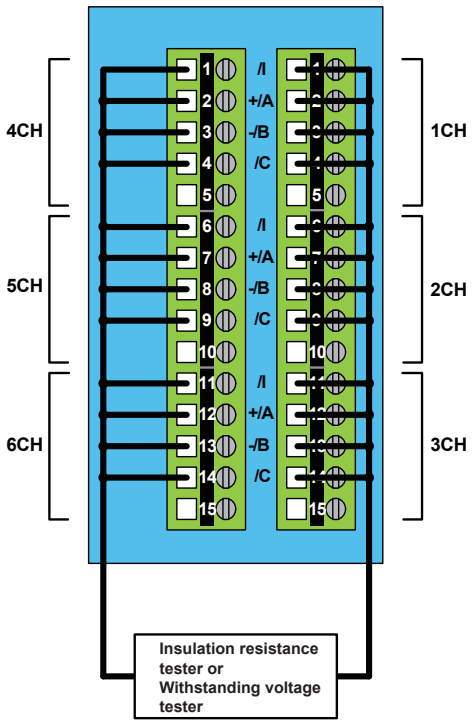
Procedure

Wire the instrument as shown in the figure below, measure the insulation resistance, then confirm that the results meet the criteria below.

Measured Item	Criteria
Input terminal to earth terminal on the MX100, MW100, or equivalent	20 MΩ or more (at DCV 500 V)
Between input terminals	20 MΩ or more (at DCV 500 V)



Input terminal to earth terminal on the jig



Between input terminals

2.6.2 Withstanding Voltage Test

Attach the 6-CH Medium-Speed Four-Wire RTD Resistance Input Module to the MX100, MW100, or equivalent before performing this test.

Procedure

Wire the instrument in the same manner as in section 2.6.2, “Insulation Resistance Test,” then confirm that the results satisfy the criteria below.
For the withstanding voltage test, in order to ensure continuity from the MX100, MW100, or equivalent’s earth to the module’s heat sink, you must fasten the module with screws after installing it onto the base plate.

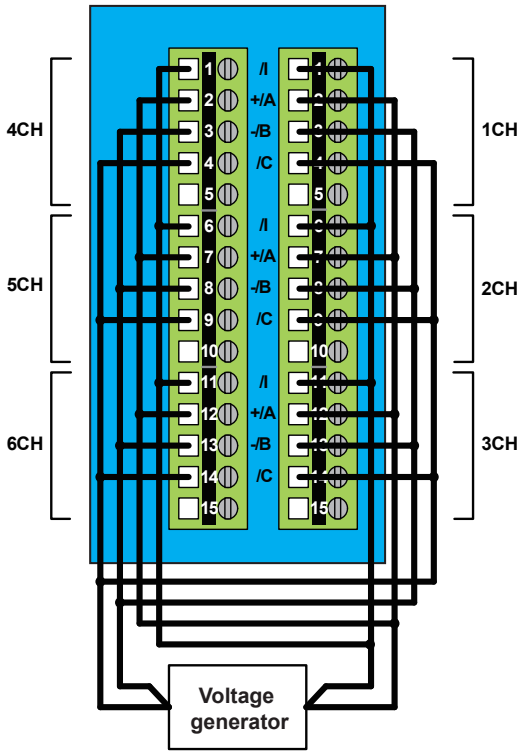
Measured Item	Criteria
Input terminal to earth terminal on the MX100, MW100, or equivalent	Current leakage of 2 mA or less at 3700 Vrms AC for 1 minute
Between input terminals	Current leakage of 1 mA or less at 1000 Vrms AC for 1 minute

When applying voltages, ensure that the rising and falling times are both at least five seconds.

2.6.3 Excessive Input Test

Procedure

1. Connect the I, +/A, /B and C terminals individually on all channels.



I, +/A to -/B, C terminals

2. Input excessive voltage in the DCV range.
   - Settings on module under test: 1 V range or less, measurement interval of 500 msec
   - Apply voltage between I, A and B, C terminals on channels 1 through 6.
   - Apply ±20 V to each for ten seconds and confirm that the instrument operates normally.
3. Input an excessive voltage in the resistance range.
   - Settings on module under test: 20 Ω, measurement interval of 500 msec
   - Short the I, A, B, and C terminals on channels 1 through 6 and apply a voltage to both ends.
   - Apply ±10 V to each for one minute and confirm that the instrument operates normally.

* Abnormalities refers to excessive current or emissions of light or smoke.

2.6.4 ID Check

This test confirms whether the module is correctly identified when module information is obtained from the MX100, MW100, or equivalent.

Procedure

Power cycle the instrument and confirm that the module ID is recognized correctly.

2.6.5 Measurement Accuracy Test

Procedure

1. Turn the power ON again, then allow the instrument to warm up for at least 10 minutes.
2. Input DC voltage and resistance to channel 2 of the MX110-V4R-M06, then confirm that the specifications are met at each range.
   - Settings on Module under Test: Set the range and measurement interval according to the table.

Measurement Interval	Duration
100 ms	5 seconds or more
500 ms	10 seconds or more

   - Test the module's input voltage while measuring the DC voltage generator's output on a digital multimeter.
   - If calibration was performed, power cycle the instrument before the test.

   Confirm that the measured results are within the judgement criteria range in the chart below.

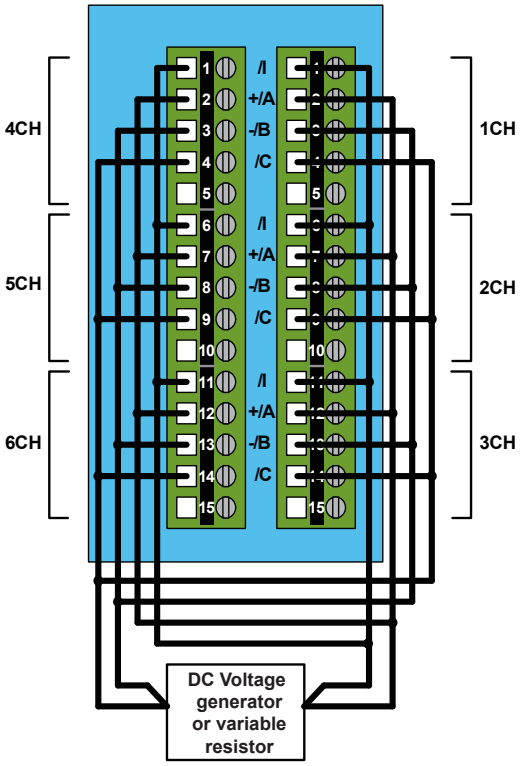
Range	Input Voltage	Measurement Interval	Specification
20 mV	+20.000 mV	500 msec	±(1% of rdg + 25 digits)
	0.000 mV		
	-20.000 mV		
60 mV	+60.00 mV	500 msec	±(0.1% of rdg + 10 digits)
	0.00 mV		
	-60.00 mV		
200 mV	+200.00 mV	500 msec	
	0.00 mV		
	-200.00 mV		
1 V	+1.0000 V	500 msec	
	0.0000 V		
	-1.0000 V		
2 V	+2.0000 V	500 msec	
	0.0000 V		
	-2.0000 V		
6 V	+6.000 V	500 msec	
	0.000 V		
	-6.000 V		
20 V	+20.000 V	500 msec	
	0.000 V		
	-20.000 V		
100 V	+100.00 V	500 msec	
	0.00 V		
	-100.00 V		
Cu10 GE High Resolution	+1.326 Ω/-200.0°C	500 msec	±(0.2% of rdg + 5°C)
	+9.036 Ω/0.0°C		
	+20.601 Ω/+300.0°C		
Pt100	+18.52 Ω/-200.0°C	500 msec	±(0.1% of rdg + 1.5°C)
	+100.00 Ω/0.0°C		
	+313.71 Ω/+600.0°C		
Pt1000	+185.2 Ω/-200.0°C	500 msec	±(0.1% of rdg + 1.5 digits)
	+1000.0 Ω/0.0°C		
	+3137.1 Ω/+600.0°C		
20 Ω	+20.000 Ω	500 msec	±(0.1% of rdg + 25 digits)
	0.000 Ω		
200 Ω	+200.00 Ω	500 msec	±(0.1% of rdg + 15 digits)
	+10.00 Ω		
	0.00 Ω		
2 kΩ	+2000.0 Ω	500 msec	±(0.1% of rdg + 10 digits)
	0.0 Ω		
2 V	+2.0000 V	100 msec	±(0.05% of rdg + 5 digits)
	0.0000 V		
	-2.0000 V		

2.6.6 Between-Channel Error Test

Procedure

1. Connect the I, A, B, and C terminals on all channels to a voltage generator or variable resistor, then confirm that the measured values on each channel meet the criteria.

   Set the measurement interval on the module under test to 500 msec.



2. Confirm that the between-channel error vales are less than the criteria given below.

Range	Input	Criteria
20 mV	Short input H to L	0.000 mV ±0.005 mV
20 Ω	20 Ω	20.000 Ω ±0.017 Ω

2.6.7 DI Contact Input Test

Connect the resistances below between the A and B terminals on any two channels, then confirm that the criteria are met.

Set the measurement interval on the module under test to 500 msec.

Range	Load	Criteria
DI CONTACT	2 kΩ	1
DI CONTACT	Connect 200 kΩ + 0.022 μF in parallel	0 or 20 kΩ

2.7 Tests of the 4-CH Strain Input Module

Tests

2.7.1 Insulation Resistance Test
2.7.2 Withstanding Voltage Test
2.7.3 Excessive Input Test
2.7.4 ID Check
2.7.5 Bridge Voltage Accuracy Test
2.7.6 Measurement accuracy
2.7.7 Between-Channel Error Test
2.7.8 Initial Balance Error Test
2.7.9 Dip Switch Operation Test

Test Instruments

The following instruments are used for testing.

Instrument	Standard	Typical Model
MX main unit or equivalent jig	MX100 or MW100 Main Module	
	MX150 Base Plate	
PC	That the software required for the test is installed	
Strain Cal Box	B8720XA or equivalent	Yokogawa B8720XA
DC voltage generator	DCV ±10 V	DC power
Insulation resistance tester	DC500 V	TOS9201 (Kikusui)
Withstanding voltage tester	AC 2 kV–4 kV	TOS9201 (Kikusui)
Tester	A device capable of performing the continuity tests (measured voltage of 42 V or less)	-
Waveform measuring instrument	100 kS/s, 8-bit or more	YOKOGAWA DL1640, OR, or equivalent
Ethernet cable		

Module Settings

Enter the following settings unless otheriwse indicated.

Measurement interval	200 ms
Filters	0 (OFF)

2.7.1 Insulation Resistance Test

Perform the withstanding voltage test before performing this test.
Wire the instrument as shown in the figure below, measure insulation resistance, then confirm that the results meet the criteria below.

Measured Item	Criteria
Input terminal to earth terminal on the MX100, MW100, or equivalent	20 MΩ or more (at DCV 500 V)
Between input terminals	10 MΩ or more (at DCV 42 V or less)
Connector shell to the ground terminal on the MX100 or equivalent	5 or less

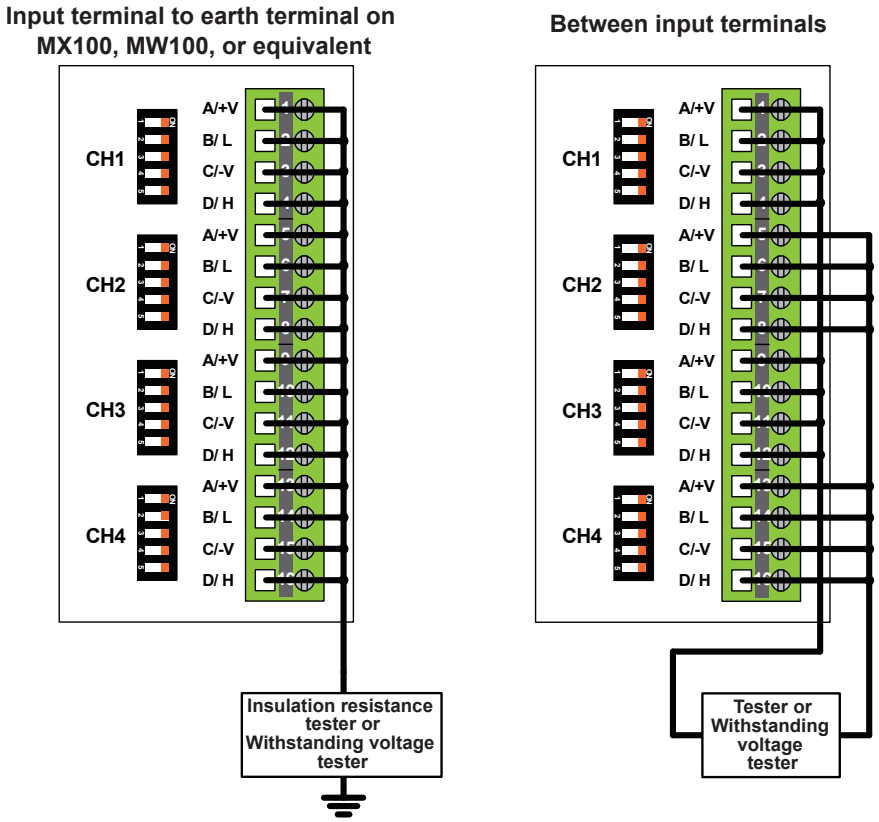
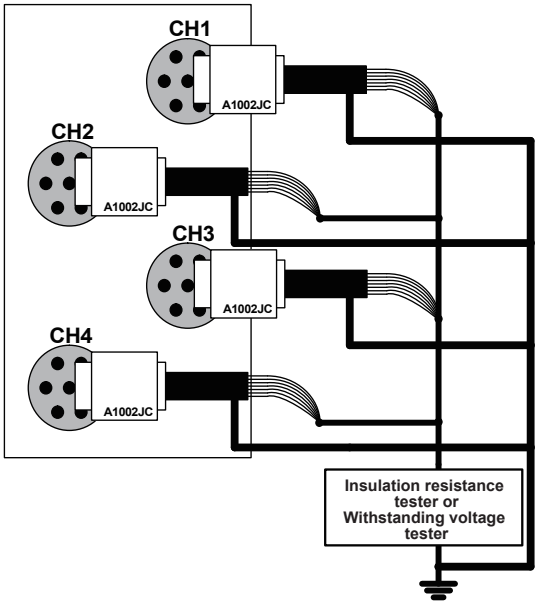
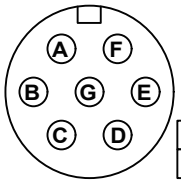


Diagram for wiring the NDIS input terminal to earth terminal on the MX100, MW100, or equivalent

The cable shell is grounded to all channels.

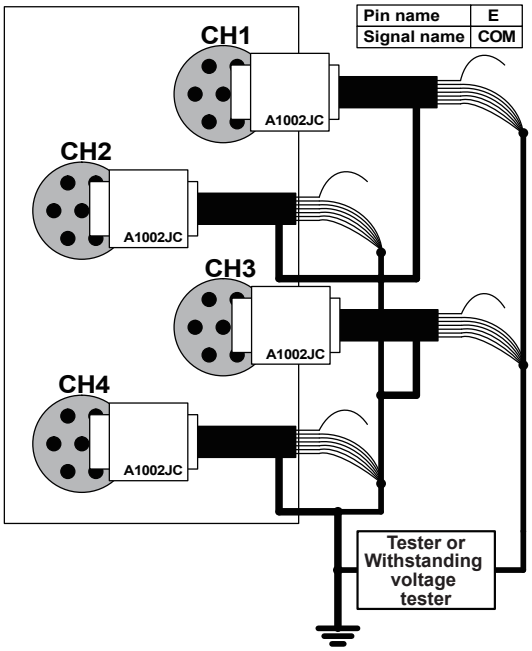


NDIS terminal pin and signal names



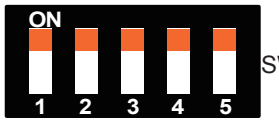
Pin name	A	B	C	D	E	F	G
Signal name	P	L	N	H	COM	PS	NS

Diagram for wiring between NDIS input terminals



- As the E terminal (COM) is common to all channels, it should be excluded when performing the between-input terminal insulation resistance or withstanding voltage tests. Also, the E terminals on all channels can be connected to each other.
- The cable shell, and the signal wires of channels 2 and 4 are grounded to all channels.

Dip switch settings



SW1–SW5: ON

In order to ensure continuity from the MX100, MW100, or equivalent's earth to the heat sink of the module under test, you must fasten the module with screws after installing onto the MX150 base plate.

2.7.2 Withstanding Voltage Test

Do not perform this test with NDIS terminals.
Attach the MX110, MW100, or equivalent to the 4-CH Strain Input Module before performing this test.
Wire the instrument in the same manner as the insulation resistance test, then confirm that the results satisfy the criteria below.

Measured Item	Criteria
Input terminal to earth terminal on the MX100, MW100, or equivalent	Current leakage of 1 mA or less at 2.3 kVrms AC for 1 minute
Between input terminals	Current leakage of 1 mA or less at 30 Vrms AC for 1 minute

Input terminal to earth terminal on the MX100, MW100, or equivalent

Short terminals A, B, C, and D on channels 1 through 4, then measure the insulation resistance between the functional ground terminals of the MX100, MW100, or equivalent.

Between input terminals

Short terminals A, B, C, and D on channels 1 and 3, then measure the insulation resistance between those channels and channels 2 and 4 with their A, B, C, and D terminals shorted.

In order to ensure continuity from the MX100, MW100, or equivalent's earth to the heat sink of the module under test, you must fasten the module with screws after installing it onto the MX150 base plate.

2.7.3 Excessive Input Test

Connect the H and L terminals individually on all channels.
Apply an excessive input according to the conditions below, and confirm that no abnormalities occur.

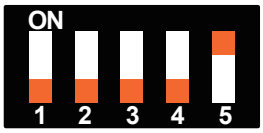
Measuring Range (Common to All Channels)	Terminals	Applied Voltage	Duration
2000STR	H to L	±10 V	1 minute each

Note

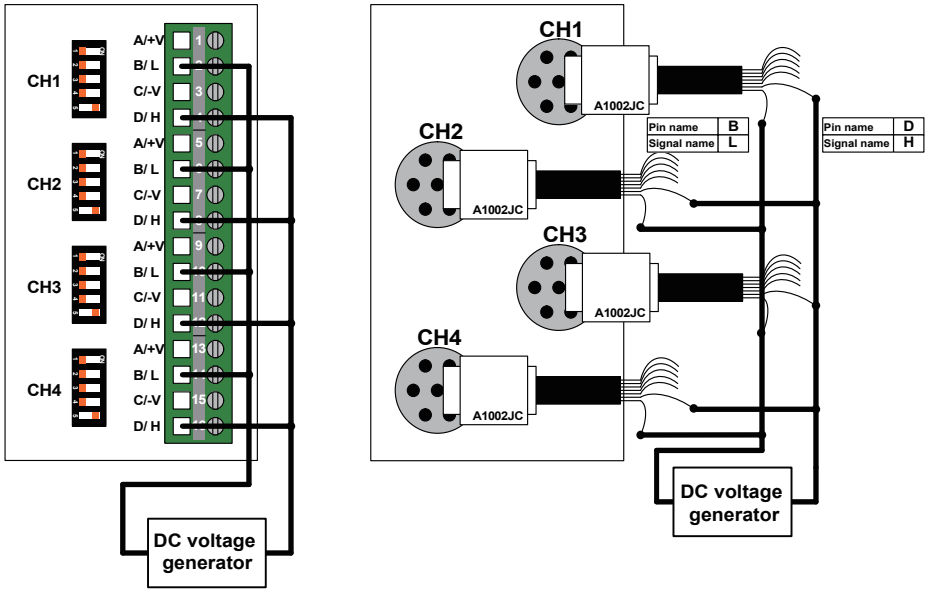
- This test can be performed during warmup.
- For this test, abnormalities refers to excessive current or emissions of light or smoke.

Dip switch setting: 4-gauge method

SW1–SW4: OFF
SW5: ON



Wiring diagram, H to L



2.7.4 ID Check

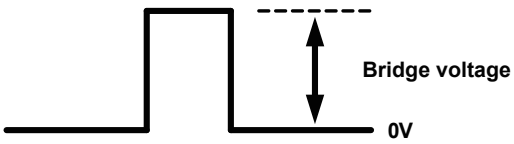
This test confirms whether the module is correctly identified when module information is obtained from the MX100, MW100, or equivalent.
(If the OFF/ON cycle is not performed on the MX100, MW100, or equivalent, the ID information is not updated.)

2.7.5 Bridge Voltage Accuracy Test

Wire as indicated below, then measure the bridge voltage on the waveform device. Confirm that the bridge voltage satisfies the criteria.

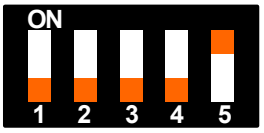
Measured CH	Any
Load resistance criterion	100 Ω ±1%, 0.1W or more
Bridge voltage criterion	2 V ±0.05 V

Measured waveform



Wiring for bridge voltage accuracy test (with -B12 and -B35)

Dip switch settings: 4-gauge method

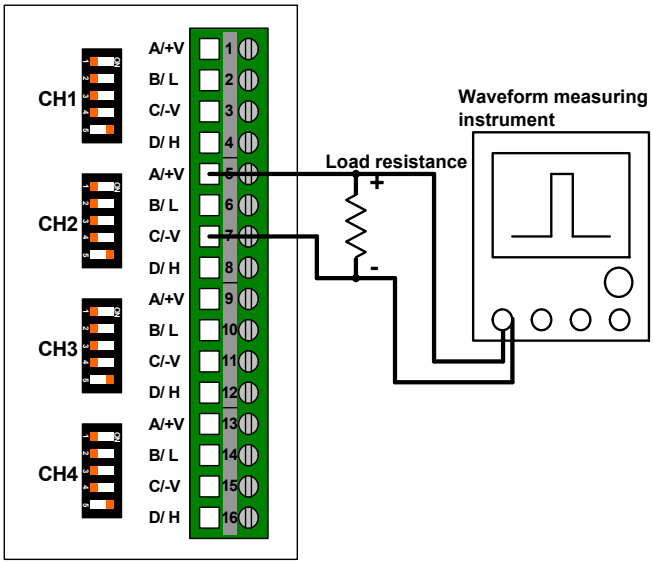


SW1 to SW4: OFF

SW5: ON

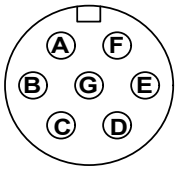
Wiring Diagram (Ex.: CH2)

Because the bridge voltage accuracy error will be equal the wiring resistance from the clamp terminal to the load resistance, the effects of wiring resistance must be kept to 0.5% or less.



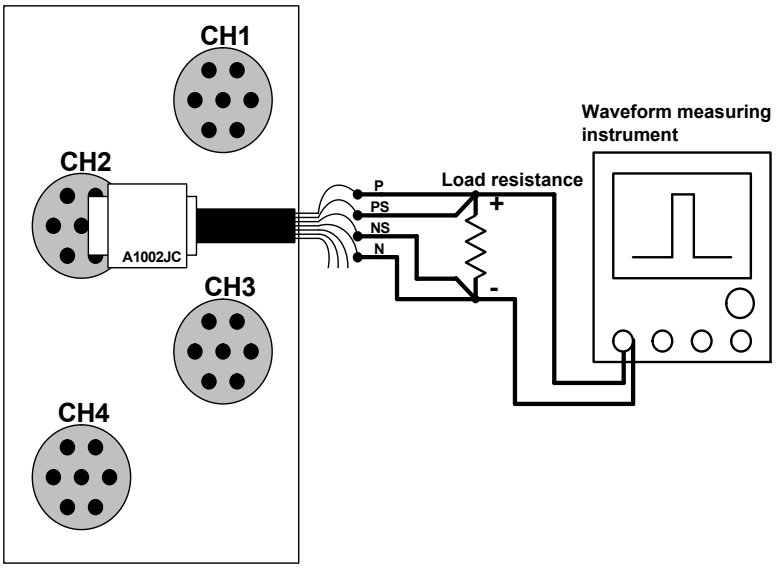
Wiring for bridge voltage accuracy test (with -NDI)

Ndis terminal pin number



Pin name	A	B	C	D	E	F	G
Signal name	P	L	N	H	COM	PS	NS

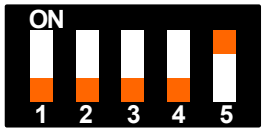
Wiring Diagram (Ex.: CH2)



2.7.6 Measurement Accuracy Test

Measurement Conditions

- Measured CH is arbitrary (CH2 recommended). Also, please remember that the measurement accuracy test is carried out at the two measurement intervals of 100 ms and 200 ms, and the ranges and criteria differ for each.
- Set the dip switches on the -B12 and -B35 modules for 4-gauge.



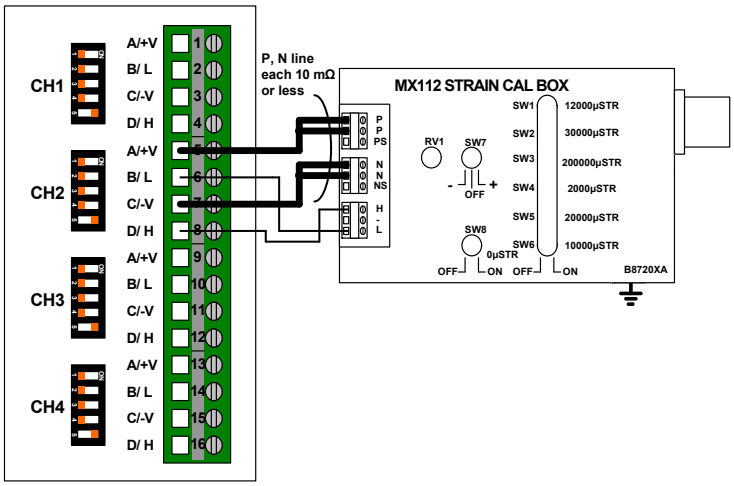
SW1 to SW4: OFF

SW5: ON

- The duration of the measured data at the 100 ms interval should be five seconds or more, and 10 seconds or more at 200 ms, and all measured data must be checked against the test criteria.
- If ever a criterion is not met, the unit should be calibrated and retested.
- Before performing the measurement accuracy test, restore the initial balance values (all measuring ranges) of the measurement channels from a PC via communication. For instructions on restoring initial balance values through PC communication, see the MX100 standard software user's manual (IM MX180-01E) or the MW100 data acquisition unit user's manual (IM MW100-01E).

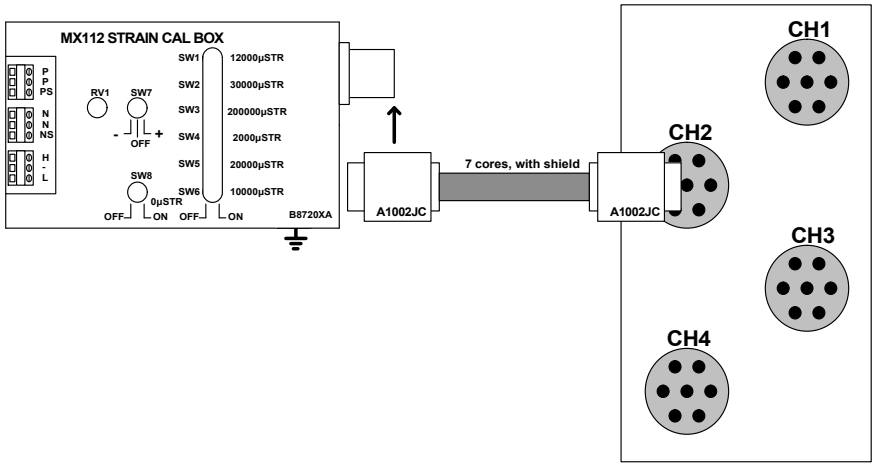
Connection

Wiring diagram for the -B12 and -B35 modules



- Because the gain error will be equal to the wiring resistance of the P and N lines, wiring must be performed so that each wiring resistance is kept to 10 mΩ or less.
- In the figure above, two P and N lines each are connected to the Cal Box in order to reduce wiring resistance. You do not necessarily have to connect two lines each.

Wiring diagram for NDIS modules



Connect the Cal Box and the module using an NDIS cable.
Since a bridge voltage sensing wire is used with NDIS terminals, the effect of wiring resistance is less than when connecting the -B12 and -B35 modules. However, gain errors will result if there is an extremely large amount of wiring resistance, therefore wiring should be done so as to keep resistance to a few ohms or less.

Cal Box Output Settings

Set the dip switches according to the table below for the desired output setting.

No.	Output Setting	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
1	0 µSTR	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	+12000 µSTR	ON	OFF	OFF	OFF	OFF	OFF	+	OFF
3	-12000 µSTR	ON	OFF	OFF	OFF	OFF	OFF	-	OFF
4	+30000 µSTR	OFF	ON	OFF	OFF	OFF	OFF	+	OFF
5	-30000 µSTR	OFF	ON	OFF	OFF	OFF	OFF	-	OFF
6	+200000 µSTR	OFF	OFF	ON	OFF	OFF	OFF	+	OFF
7	-200000 µSTR	OFF	OFF	ON	OFF	OFF	OFF	-	OFF
8	+2000 µSTR	OFF	OFF	OFF	ON	OFF	OFF	+	OFF
9	-2000 µSTR	OFF	OFF	OFF	ON	OFF	OFF	-	OFF
10	+20000 µSTR	OFF	OFF	OFF	OFF	ON	OFF	+	OFF
11	-20000 µSTR	OFF	OFF	OFF	OFF	ON	OFF	-	OFF
12	+10000 µSTR	OFF	OFF	OFF	OFF	OFF	ON	+	OFF
13	-10000 µSTR	OFF	OFF	OFF	OFF	OFF	ON	-	OFF
14	+2000 µSTR	No. 2 No.12							
15	-2000 µSTR	No. 3 No.13							
16	+20000 µSTR	No. 4 No.12							
17	-20000 µSTR	No. 5 No.13							

Test Range and Product Specification

100 ms Interval

Test Range	Test Points		Specification
	Measured Value	Setting	
200000 µSTR	+200000 µSTR	No. 6	±1% of Range
	0 µSTR	No. 1	
	-200000 µSTR	No. 7	

200 ms Interval

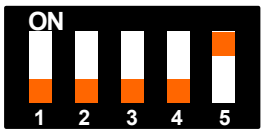
Test Range	Test Points		Specification
	Measured value	Setting	
2000 µSTR	+2000 µSTR	No. 8	±0.5% of Range
	0 µSTR	No. 1	
	-2000 µSTR	No. 9	
20000 µSTR	+20000 µSTR	No.10	±0.3% of Range
	+10000 µSTR	No,12	
	0 µSTR	No. 1	
	-10000 µSTR	No.13	
	-20000 µSTR	No.11	
200000 µSTR	+200000 µSTR	No. 6	±0.3% of Range
	0 µSTR	No. 1	
	-200000 µSTR	No. 7	

For instructions on setting test points, see “Cal Box Settings” on the previous page.

2.7.7 Between-Channel Error Test

1. Connect the Cal box to all channels in parallel.
2. Restore the initial balance values (all measuring ranges) of all channels to the initial values from a PC via communication.
3. Enter the following settings.

   Measurement range 2000 µSTR
   Measurement Interval 200 ms
   Filters OFF
   Duration 10 s or more
   Dip switch setting (for the -B12 and -B35 modules) 4-gauge method



SW1 to SW4: OFF

SW5: ON

4. Apply the following input values and confirm that the between-channel error satisfies the product specification.

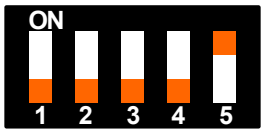
Test Points		Specification
Measured value	Setting	
+2000 µSTR	No. 8	+2000 µSTR ±10 µSTR
-2000 µSTR	No. 9	2000 µSTR ±10 µSTR

For instructions on setting test points, see “Cal Box Settings.”
In the case of the -B12 and -B35 modules, since the between-channel error for all channels will be equal to the wiring resistance error, be sure to make the wiring resistance values the same.

2.7.8 Initial Balance Error Test

1. Connect the Cal Box to the measurement channels.
2. Enter the following settings.

Measured CH	Any (CH2 recommended)
Measurement interval	200 ms
Filters	OFF
Duration	10 s or more
Dip switch setting (for -B12 and -B35)	4-gauge method



SW1 to SW4: OFF

SW5: ON

3. Perform initial balancing using the indicated initial balance values for each measuring range.
4. Apply the following input values and confirm that the measured values meet the criteria.

Test Range	Test Points		Initial balance		Specification
	Measured value	Setting	Output value	Setting	
2000 µSTR	+2000 µSTR	No. 2	+10000 µSTR	No.12	±0.5% of Range
	0 µSTR	No.12			
	2000 µSTR	No. 3	-10000 µSTR	No.13	
	0 µSTR	No.13			
20000 µSTR	+20000 µSTR	No. 4	+10000 µSTR	No.12	±0.3% of Range
	0 µSTR	No.12			
	20000 µSTR	No. 5	-10000 µSTR	No.13	
	0 µSTR	No.13			

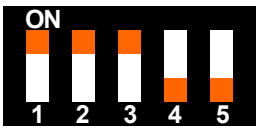
For instructions on setting test points, see “Cal Box Output Settings.”

2.7.9 Dip Switch Operation Test (-B12, -B35 Only)

You can check whether the dip switches are operating normally by confirming that measurements can be taken using the 1-gauge method.
(Confirmation using the 4-gauge method can be made with the measurement accuracy and channel error tests.)

1. Set the dip switches for the 1-gauge, 2-wire method.

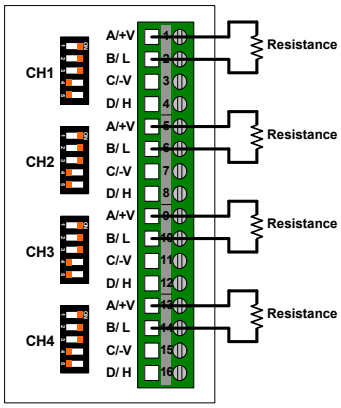
   Dip switch settings



SW1 to SW3: ON
SW4 to SW5: OFF

2. Connect resistance independantly to all channels as shown in the figure below.

   The wiring resistance of the module itself is large, and therefore needs to be reduced as much as possible.



Resistance stated value

Test module	Resistance stated value
-B35	350Ω ± 0.01%
-B12	120Ω ± 0.01%

3. Restore the initial balance values of all channels to the initial values from a PC via communication.
4. Enter the following settings.

Measured CH	All CH
Measurement range	2000 μSTR
Measurement interval	200 ms
Filters	OFF
Duration	10 s or more

5. Confirm that the measured values are within the stated values.

   Measured Value Stated Value 0μSTR ±400μSTR

2.8 Tests of the 10-CH, High-Speed Digital Input Module (MX115-D05-H10)

Tests

2.8.1 Insulation Resistance Test
2.8.2 Withstanding Voltage Test
2.8.3 Digital Input Test
2.8.4 ID Check

Instruments Used

Instrument	Standards, Recommended Products Etc.
MX100, MW100, or equivalent	MX100 or MW100 Main Module
	MX150 Base Plate
PC ‡	Ensure that the software required for the test is installed
DC voltage generator	Accuracy: ±1% + 10 mV or less
Variable resistor or fixed resistance	Accuracy: ±1% or less
Insulation resistance tester	DC500 V
Withstanding voltage tester	AC 1 kV–3 kV
Front terminal	FRONT TERMINAL ASSY (B8720BF)*
Screw terminal†	10-CH screw terminal block (772061)
Cable†	Combination cable (772062-050 or 772062-100)

* Regarding the front terminal
If /NC is included in the model name of the assembly, use B8720BF.
If /NC is not included in the model name of the assembly, do not use B8720BF.

† Regarding the screw terminal block and cable
Used for confirmation of the ID setting. If the ID matches, you can substitute with a device whose connector has been altered.

‡ That the module settings and measured values can be read in.

Cautions When Performing This Test

- Connect to the PC only for the digital input test.
- If the /NC option is installed, use B8720BF during the test.
  When the test is complete, be sure you remove the B8720BF.
  If option /NC is not installed, do not use the B8720BF.

2.8.1 Insulation Resistance Test

For this test, the Ten-Channel, High-Speed Digital Input Module is installed with the MX100, MW100, or equivalent device.

Procedure

1. The insulation resistance between the terminals indicated below are tested. When performing the test, you must fasten the module being tested to the MX150 base plate jig with screws.

   Input terminals: short the input terminals on all channels

   Earth terminals: the unit or equivalent's functional earth terminal

2. Confirm that the criterion below is met.

   Input terminal to earth terminal: an insulation resistance of 20 MΩ or more at DC500 V

2.8.2 Withstanding Voltage Test

For this test, the Ten-Channel, High-Speed Digital Input Module is installed with the MX100, MW100 or equivalent device.

Procedure

1. Measure the withstanding voltage at the same locations indicated in step 1 of the insulation resistance test. When performing the test, you must fasten the module being tested to the MX150 base plate jig with screws.
2. Confirm that the criterion below is met.

   Input terminal to earth terminal: AC2300 Vrms for 1 minute, 2 mA or less

2.8.3 Display Input Test

For this test, the Ten-Channel, High-Speed Digital Input Module is installed with the MX100, MW100 or equivalent device.

Procedure

1. Allow a warm-up of 10 minutes or more.
2. Set the measurement interval on the module being tested to 500 ms.
3. Input DC voltage and resistance to each channel of the Ten-Channel High-Speed Digital Input Module, and confirm each input value.

   If the /NC option is installed, use B8720BF during the test.

   (When the test is complete, be sure to remove the B8720BF.)

<MX115-D05-H10>

Syntax	Input Voltage, Resistance	Measurement Interval	Judgment Criterion
LEVEL	+1 V or less	500 ms	That the input channel reads 0 That the channels with no input read 1
LEVEL	+3 V or more	500 ms	That the input channel reads 1 That the channels with no input read 0
CONTACT	100 Ω or less	500 ms	That the input channel reads 1 That the channels with no input read 0
CONTACT	100 kΩ or more	500 ms	That the input channel reads 0 That the channels with no input read 1

<MX115-D24-H10>

Syntax	Input Voltage, Resistance	Measurement Interval	Judgment Criterion
LEVEL	+6 V or less	500 ms	That the input channel reads 0 That the channels with no input read 1
LEVEL	+16 V or more	500 ms	That the input channel reads 1 That the channels with no input read 0
CONTACT	100 Ω or less	500 ms	That the input channel reads 1 That the channels with no input read 0
CONTACT	100 kΩ or more	500 ms	That the input channel reads 0 That the channels with no input read 1

2.8.4 ID Check

This test confirms whether the module and terminal board types are correctly identified when module information is obtained from the jig on the MX100 or equivalent.

Procedure

Exchange the terminal board from the B8720BF to a screw terminal block or equivalent, and then check the ID before and after the new board is installed.
When exchanging a terminal board, you must make sure that the power to the MX100 or equivalent is turned OFF.

2.9 Tests of the 8-CH Analog Output Module

Test Instruments

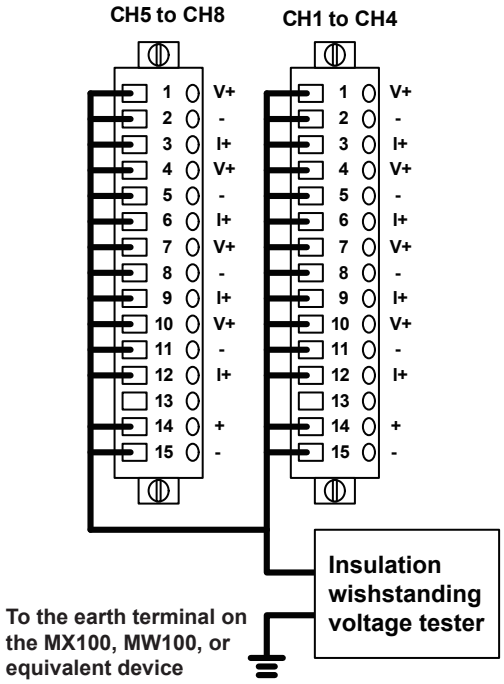
Instrument	Standards, Recommended Products etc.
MX100, MW100, or equivalent	MX100 or MW100 main module
	MX150 base plate
PC	That the software required for the test is installed
External power supply	24 V ±10% 0.5A or more
DMM	Accuracy Voltage ±(0.01% of rdg. +50 V) or less
	Current ±(0.01% of rdg. +1 A) or less Agilent 3458A
Fixed resistance	600 Ω ±5% 0.5W or more
Insulation resistance tester	DC500 V TOS9201 (Kikusui)
Withstanding voltage tester	AC 2 kV–4 kV TOS9201 (Kikusui)
Ethernet cable	

Tests

2.9.1 Insulating Resistance Test
2.9.2 Withstand Voltage Test
2.9.3 ID Check
2.9.4 Power ON Output Check
2.9.5 Output Accuracy Test

2.9.1 Insulation Resistance Test

Install the module on the MX100, MW100, or equivalent before performing this test.
Perform the withstanding voltage test before performing this test.
Wire the devices as in the figure below, then confirm that the criteria are met.



Pins 13 on each output connector are not connected internally, therefore you can choose whether or not to make the connections shown in the wiring diagram.
In order to ensure continuity from the MX100, MW100, or equivalent's earth to the heat sink of the module under test, you must fasten the module with screws after installing it onto the MX150 base plate.

Terminals Measured	Criteria
Output terminal to earth terminal on the MX100, MW100, or equivalent	20 MΩ or more at DC 500 V

2.9.2 Withstanding Voltage Test

Install the module under test in the MX110, MW100, or equivalent before performing this test.

When applying voltages, ensure that the rising and falling times are both at least five seconds.

Wire the instrument in the same manner as in the insulation resistance test, then confirm that the results satisfy the criteria below.

Terminals Measured	Criteria
Output terminal to earth terminal on the MX100, MW100, or equivalent	AC2300 Vrms for 1 minute, with current leakage of 2 mA or less

2.9.3 ID Check

This test confirms whether the module is correctly identified when module information is obtained from the MX100, MW100, or equivalent.

(If the OFF/ON cycle is not performed on the MX100, MW100, or equivalent, the ID information is not updated.)

2.9.4 Power ON Output Check

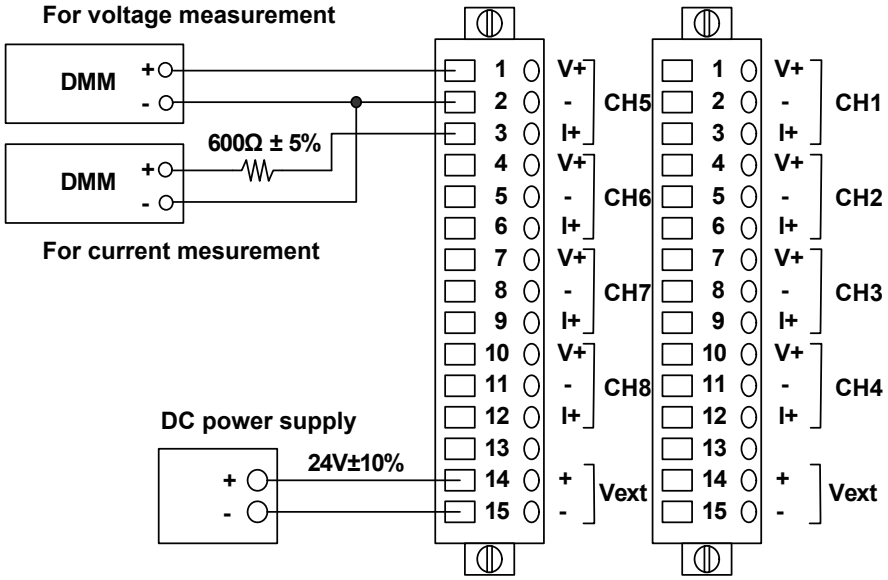
Wire the units as shown in the connection diagram, then perform the power ON output check. The figure below shows an example of wiring for measurement on CH5. Connect other channel in the same manner and perform measurement.

Precautions to Be Taken When Connecting Cables

- For current measurements, connect 600 Ω series resistance as shown in the figure below before taking measurements.
  When using a DMM whose current measuring range is of a large internal resistance, adjust the external resistance value so that the total resistance is 600 Ω.
  Recommended test instrumentsThe internal resistance of the Agilent 3458A is as follows.

Range	Shunt Resistor
	100 mA 1 Ω

- Connect the external power supply (24 V ±10) to the Vext terminal as in the figure below.
  The Vext terminals of the left and right connectors are connected inside the module, therefore the power must only be connected to one of the terminals. Do not connect to both terminals.



<MX100>

1. Enter settings in the table below to specify output at power ON using the MX100 standard software or the MX100/DARWIN API. Power cycle the MX100 main unit or equivalent, then measure the output on all channels. (Without PC communications.)

   Enter the same settings on all channels.
   When using the API for settings, enter settings that are equivalent to the following.

Item	Setting	Description/Notes
Enable/disable	Enabled	
Action	User output	
Voltage/current	Voltage	
Span	Need not specify	-10–10 V
Output upon power ON	Preset value	Sets the power ON operation as the preset.
Output upon error	Preset value	Sets the output upon error as the preset.
Preset value	+11 V	Sets +11 V as the preset value.
Other	Not required	

2 Confirm that the output voltages of all channels are within the allowable ranges shown below.

Output Terminal	Allowable Range
Voltage	11 V ±32 mV
Current	22 mA–24.6 mA

<MW100>

1. Referring to the MW100 user's manual for browser operation, or by using communication commands, set the output at power ON according to the table below. Power cycle the MW100 main unit or equivalent, then measure the output on all channels.

   Output Range Settings

Item	Setting	Description/Notes
Output Type	AO	
Output method	COM	Command output
Output range	10 V	
Span	Need not specify	-10–10 V
Preset value	+11 V	
Reference channel	Need not specify	

   Output Operation Setting

Item	Setting
Power ON	PRESET
Error occurence	PRESET

2 Confirm that the output voltages of all channels are within the allowable ranges shown below.

Output terminal	Allowable Range
Voltage	11 V ±32 mV
Current	22 mA – 24.6 mA

2.9.5 Output Accuracy Test

Measurement Conditions

After calibration, if you do not turn OFF the power at least once, even if you perform measurement correctly the calibration data may not be recorded accurately. Therefore, power cycle the unit before performing the test.
Perform measurement on all channels.

Connection

Wire the units in the same manner as in the “Output at Power ON Check.”

Settings

<MX100>

Set one channel at a time, setting the output of channels not under test to 0 V.
When using the MX100/DARWIN API for settings, enter settings that are equivalent to the following.

Item	Setting	Description/Notes
Enable/disable	Enabled	
Action	User output	
Voltage/current	Voltage	Not relevant when using the API
Span	Need not specify	-10–10 V is acceptable.
Output upon power ON	Preset value	Sets the power ON operation as the preset.
Output upon error	Preset value	Sets the output upon error as the preset.
Preset value	+0 V	Sets +0 V as the preset value.
Other	Not required	

The relationship between output values of voltage and current on the same channel are as follows.

- 1 V 4 mA
- 5 V 20 mA

Therefore, you can check the output accuracy of voltage and current simultaneously with one setup.

<MW100>

Referring to the MW100 user’s manual for browser operation, or by using communication commands, , set the output at power ON according to the table below. Power cycle the MW100 main unit or equivalent, then measure the output on all channels.

For voltage of output range

Item	Setting	Description/Notes
Output Type	AO	
Output method	COM	Command output
Output range	10 V	
Span	Need not specify	-10 to 10 V
Preset value	0 V	
Reference channel	Not required	

For current of output range

Item	Setting	Description/Notes
Output Type	AO	
Output method	COM	Command output
Output range	20 mA	
Span	Need not specify	0 to 20 mA
Preset value	+10 mA	
Reference channel	Not required	

Output Operation Setting

Item	Setting
Power ON	PRESET
Error occurence	PRESET

Items to Be Checked

Confirm that all channels under test satisfy the specifications in the table below.
Also confirm that the output from channels not under test meet the criteria for 0 V in the table below.

<MX100>

Voltage Output Criteria

Setting	Standard Value	Specification
-10 V (20000)	-10 V	±20 mV
0 V (0)	0 V	
+5 V (10000)	+5 V	
+10 V (20000)	+10 V	

Current Output Criteria

Setting	Standard Value	Specification
+1 mA (500)	1 mA	±40A
+10 mA (5000)	10 mA	
+20 mA (10000)	20 mA	
+Over (20000)	22 mA or more	22 mA or more

The parentheses ( ) indicate the count value when entering settings with the MX100/DARWIN API.

<MW100>

Voltage output criteria

Setting	Standard Value	Specification
-10 V (-10000)	-10 V	±20 mV
0 V	0 V	
+5 V (5000)	+5 V	
+10 V (10000)	+10 V	

Current Output Criteria

Setting	Standard Value	Specification
+1 mA (1000)	1 mA	±40A
+10 mA (10000)	10 mA	
+20 mA (20000)	20 mA	
+Over (25000)	22 mA or more	22 mA or more

2.10 8-CH, Medium-Speed PWM Output Module

Test Instruments

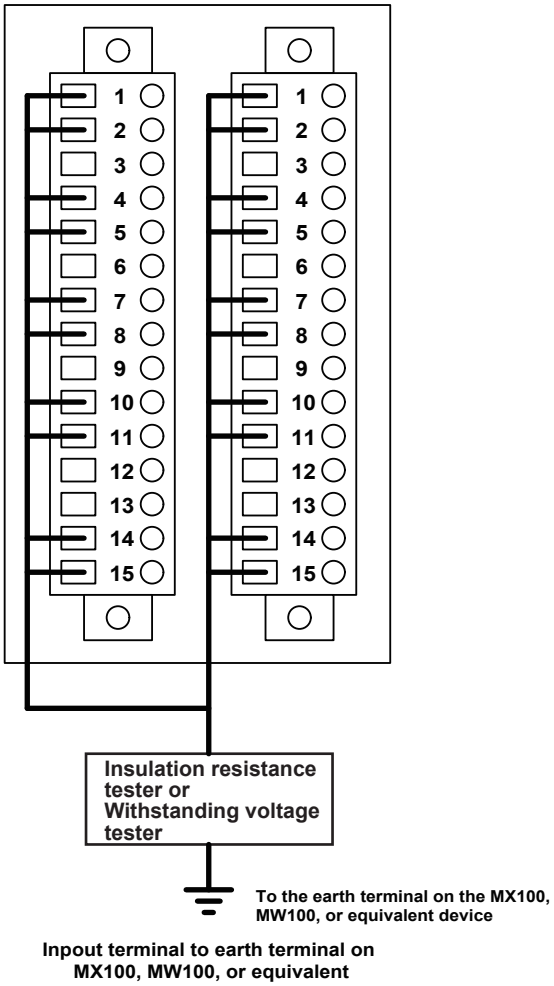
Instrument	Standards, Recommended Products etc.
MX100, MW100, or equivalent	MX100 or MW100 Main Module MX150 base plate
PC	That the software required for the test is installed
DC power supply	External power source for the module under test. 4–24 V, 2 A or more Accuracy: ±5% PAS series (Kikusui)
Load resistance	Use a different device for accuracy measurement and testing the operation of the overcurrent protection circuit. ±5% During accuracy measurement: 100 Ω/1 W or more When checking peak values and overcurrent protection circuit: 5 Ω/6 W or more
DMM	Voltage accuracy : ±(0.1% of rdg) or more, YOKOGAWA 7555
Counter	$1X10^{-9}$S resolution, stability: $5X10^{-7}$Hz Agilent 53131A
Insulation resistance tester	DC500 V TOS9201 (Kikusui)
Withstanding voltage tester	AC 1 kV–3 kV

Tests

2.10.1 Insulation Resistance Test
2.10.2 Withstand Voltage Test
2.10.3 ID Check
2.10.4 Peak Value Test
2.10.5 Pulse Interval Accuracy Test
2.10.6 Pulse Duty Accuracy
2.10.7 Power ON Output Check
2.10.8 Overcurrent Protection Circuit Operation Test

2.10.1 Insulation Resistance Test

Install the module on the MX100, MW100, or equivalent before performing this test.
Perform the withstanding voltage test before this test.
Wire the devices as in the figure below, then confirm that the criteria are met.



Terminals Measured	Criteria
Input terminal to earth terminal on the MX100, MW100, or equivalent	20 MΩ or more (at DCV 500 V)

2.10.2 Withstanding Voltage Test

Install the module on the MX100, MW100, or equivalent before performing this test.

Note

- In order to ensure continuity from the MX100, MW100, or equivalent's earth terminal to the module under test's heat sink, you must fasten the module with screws after installing it onto the base plate.
- When applying voltages, ensure that the rising and falling times are both at least five seconds.

Wire the instrument in the same manner as the insulation resistance test, then confirm that the results satisfy the criteria below.

Terminals Measured	Criteria
Input terminal to earth terminal on the MX100, MW100, or equivalent	2300 Vrms AC for 1 minute Leakage current of 2 mA or less

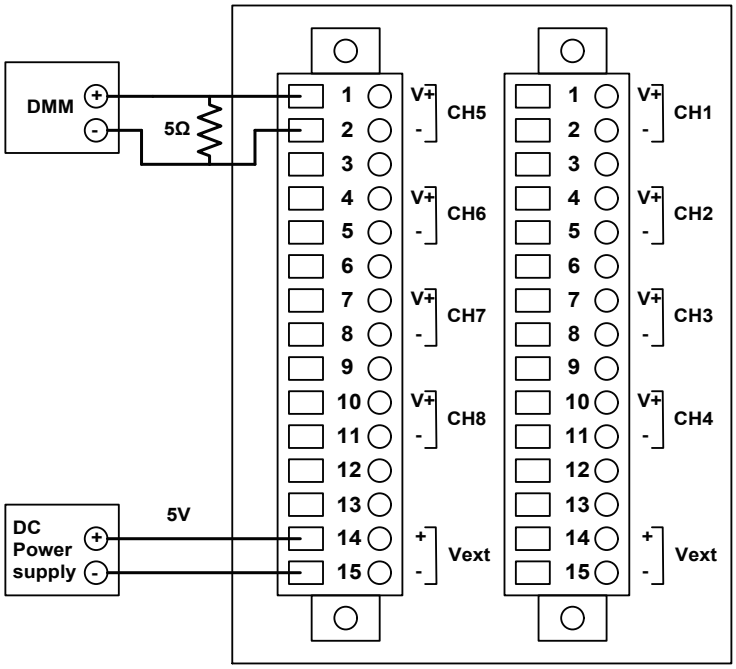
2.10.3 ID Check

This test confirms whether the module is correctly identified when module information is obtained from the MX100, MW100, or equivalent.
(If the OFF/ON cycle is not performed on the MX100, MW100, or equivalent, the ID information is not updated.)

2.10.4 Peak Value Test

Wire the units as in the figure below, enter all settings (PWM output settings), then confirm that the criteria are met.
Use an external power supply of 5 V, and load resistance of 5 Ω.

The wiring diagram in the figure below is an example of measurement on CH5. Actual measurment should be performed on all channels.



Peak value check wiring diagram

PWM Outupt Settings

<MX100 Settings>

Connect to the PC, then enter the following settings using the MX100 standard software. When using the MX100/DARWIN API for settings, enter settings that are equivalent to the following.

Item	Setting	Remarks
Select output or no output	Enabled	
Select the source action	User output	
Span	Need not specify	
Output upon power ON	Preset value	Sets the output at power ON as a preset value.
Output upon error	Preset value	Sets the output upon error as a preset value.
Preset value	0.000 %	Sets 0% duty.
Pulse interval	10 ms	Sets the pulse interval to 10 ms.
Other settings	Not required	

<MW100 Settings>

Referring to the MW100 user's manual for browser operations, or by using communication commands, power cycle the MW100 main unit or equivalent, then measure the output on all channels.

Output Range Settings

Item	Setting	Remarks
Output type	PWM	
Output method	COM	Command output
Output range	1 ms	
Span	Need not specify	
Pulse interval	10	
Preset value	0.000%	Duty 0%
Reference channel	Not required	

Output Operation Setting

Item	Setting
Power ON	PRESET
Error occurence	PRESET

Criteria (for the MX100 and MW100)

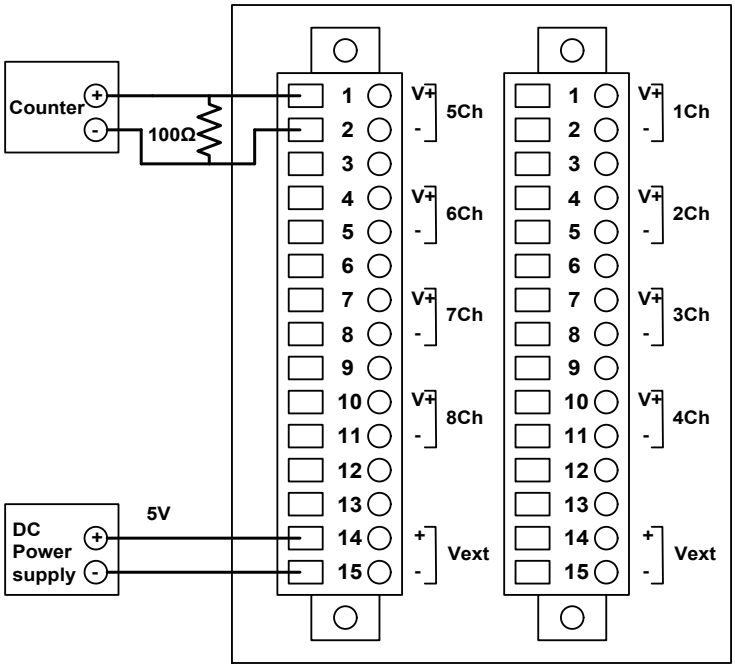
PWM Output Setting	Criteria
100.0 %	3.8 V or more

2.10.5 Pulse Interval Accuracy Test

Wire the units as in the figure below, enter all settings (PWM output settings), then confirm that the criteria are met.

The figure below shows an example of wiring CH5. Actual measurment should be performed on all channels.

Use an external power supply of 5 V, load resistance of 100 Ω, and a counter trigger level of 2.5 V.



Puls interval check and puls duty check wiring diagram

PWM Outupt Settings

<MX100 Settings>

Connect to the PC, then enter the following settings using the MX100 standard software. When using the MX100/DARWIN API for settings, enter settings that are equivalent to the following.

Item	Setting	Remarks
Enable/disable	Enabled	
Action	User output	
Span	Need not specify	
Output upon power ON	Preset value	Sets the output at power ON as a preset value.
Output upon error	Preset value	Sets the output upon error as a preset value.
Preset value	0.000 %	Sets 0% duty.
Resolution	Depends on the test	
Pulse interval	Depends on the test	
Other settings	Not required	

<MW100 Settings>

Using the MW100 user's manual or communication commands, power cycle the MW100 main unit or equivalent, then measure the output on all channels.

Item	Setting	Remarks
Output type	PWM	
Output method	COM	Command output
Output range	Depends on the test	
Span	Need not specify	
Pulse interval	Depends on the test	
Preset value	0.000 %	Sets 0% duty.
Reference channel	Not required	

Output Operation Setting

Item	Setting
Power ON	PRESET
Error occurence	PRESET

Criteria (for the MX100 and MW100)

If entering the pulse interval and PWM settings according to the table below, confirm that the output pulse interval of the specified channels satisfies the criteria.
(Set for each channel. Channels not under test output 0%).

Pulse Interval	Output Setting	Criteria
1 ms	50.000 %	1 ms ±80 ns
5 ms (1 ms ×5)	50.000 %	5 ms ±400 ns
10 ms (10 ms ×1)	50.000 %	10 ms ±800 ns
100 ms (10 ms ×10)	50.000 %	100 ms ±8 s

2.10.6 Pulse Duty Accuracy

Wire the units in the same manner as in the “Pulse Interval Accuracy Test,” enter all settings (PWM output settings), then confirm that the criteria are met.
The wiring diagram for the pulse interval accuracy test shows an example of wiring CH5. Actual measurment should be performed on all channels.
Use a counter trigger level of 2.5 V.

PWM Outupt Settings

<MX100 Settings>

Connect to the PC, then enter the following settings using the MX100 standard software. When using the MX100/DARWIN API for settings, enter settings that are equivalent to the following.

Item	Setting	Remarks
Enable/disable	Enabled	
Action	User output	
Span	Need not specify	
Output upon power ON	Preset value	Sets the output at power ON as a preset value.
Output upon error	Preset value	Sets the output upon error as a preset value.
Preset value	0.000 %	Sets 0% duty.
Resolution	Depends on the test	
Pulse interval	Depends on the test	
Other settings	Not required	

<MW100 Settings>

Referring to the MW100 user’s manual for browser operation, or by using communication commands, set up the MW100 or equivalent according to the table below.

Item	**Setting**	**Remarks**
Output type	PWM	
Output method	COM	Command output
Output range	Depends on the test	
Span	Need not specify	
Pulse interval	Depends on the test	
Preset value	0.000 %	Sets 0% duty.
Reference channel	Not required	

Output Operation Setting

Item	**Setting**
Power ON	PRESET
Error occurence	PRESET

Criteria (for the MX100 and MW100)

If entering the pulse duty and PWM settings according to the table below, confirm that the output pulse interval of the specified channels satisfies the criteria.
(Set for each channel. Channels not under test output 0%).

Pulse interval	**PWM Output Setting**	**Criteria**
1 ms	1.000 %	Duty: 1 % ±0.15 % (Pulse interval: 10s ±1.5 s)
	50.000 %	Duty: 50 % ±0.15 % (Pulse interval: 500 s ±1.55s)
	99.000 %	Duty: 99 % ±0.15 % (Pulse interval: 990 s ±1.59s)
5 ms (1 ms ×5)	50.000 %	Duty: 50 % ±0.03 % (Pulse interval: 2.5 ms ± 1.75s)
10 ms (10 ms ×10)	1.000 %	Duty: 1 % ±0.015 % (Pulse interval: 0.1 ms ±1.51 s)
	50.000 %	Duty: 50 % ±0.015 % (Pulse interval: 5 ms ±1.9 s)
	99.000 %	Duty: 99 % ±0.015 % (Pulse interval: 9.9 ms ±1.9 s)
100 ms (10 ms ×10)	50.000 %	Duty: 50 % ±0.003 %

2.10.7 Power ON Output Value Setting

Wire the units in the same manner as in the “Pulse Interval Accuracy Test,” enter all settings (PWM output settings), then confirm that the criteria are met.
The wiring diagram for the pulse interval accuracy test shows an example of wiring CH5. Actual measurment should be performed on all channels.
Use an external power supply of 5 V, and load resistance of 100 Ω.

PWM Outupt Settings

<MX100 Settings>

Connect to the PC, then enter the following settings using the MX100 standard software. When using the MX100/DARWIN API for settings, enter settings that are equivalent to the following.

Item	Setting	Remarks
Enable/disable	Enabled	
Select the source action	User output	
Span	Need not specify	
Output upon power ON	Preset value	Sets the output at power ON as a preset value.
Output upon error	Preset value	Sets the output upon error as a preset value.
Preset value	50.000 %	Set 50% duty.
Resolution	1 ms	
Pulse interval	200 ms	
Other settings	Not required	

<MW100 Settings>

Using the MW100 user’s manual or communication commands, power cycle the MW100 main unit or equivalent, then measure the output on all channels.

Item	Setting	Remarks
Output type	PWM	
Output method	COM	Command output
Output range	1 ms	
Span	Need not specify	
Pulse interval	200	
Preset value	50.000 %	Set 50% duty.
Reference channel	Not required	

Output Operation Setting

Item	Setting
Power ON	PRESET
Error occurence	PRESET

Criteria (for the MX100 and MW100)

Power cycle the MX100 main unit or equivalent, then measure the output values without entering any settings using the PC.
Use a trigger level of 2.5 V. In this case, confirm that the output voltages of all channels are within the allowable ranges.

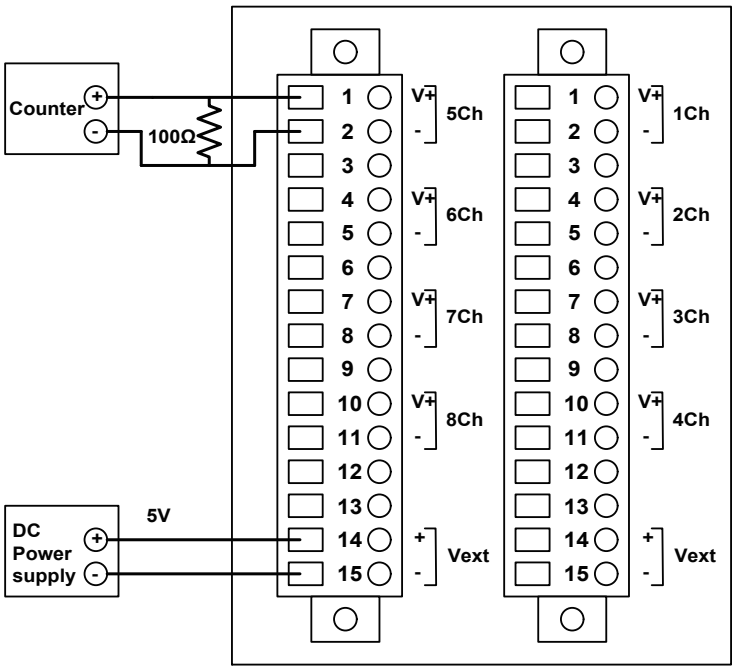
Pulse Interval	Pulse Duty
200 ms ±16S	Duty 50% ±0.003%

2.10.8 Overcurrent Protection Circuit Operation Test

Wire the units as in the figure below, enter all settings (PWM output settings), then confirm that the criteria are met.
The wiring diagram shows an example of wiring CH5. Actual measurment should be performed on all channels.
Use an external power supply of 5 V or 12 V, and load resistance of 5 Ω.

Caution

For this test, set an output of 100.000% on each channel under test, and 0.000% for all other channels. With other tests, the fuses in the internal circuitry can blow if multiple channels are turned ON at the same time.



Puls interval check and puls duty check wiring diagram

PWM Outupt Settings

<MX100 Settings>

Connect to the PC, then enter the following settings using the MX100 standard software. When using the MX100/DARWIN API for settings, enter settings that are equivalent to the following.

Item	Setting	Remarks
Enable/disable	Enabled	
Action	User output	
Span	Need not specify	
Output upon power ON	Preset value	Sets the output at power ON as a preset value.
Output upon error	Preset value	Sets the output upon error as a preset value.
Preset value	0.000 %	Sets 0% duty.
Pulse interval	10 ms	
Other settings	Not required	

<MW100 Settings>

Item	Setting	Remarks
Output Type	PWM	
Output method	COM	Command output
Output range	1 ms	
Span	Need not specify	
Pulse interval	10	
Preset value	0.000%	
Reference channel	Not required	

Output Operation Setting

Item	Setting
Power ON	PRESET
Error occurence	PRESET

Criteria (for the MX100 and MW100)

Change the settings following the steps in the table below, then confirm that the results satisfy the criteria for voltage.

Step	External Power Supply	PWM Output Setting	Voltage Criterion
1	5 V	100.000 %	3.8 V or more
2	12 V	100.000 %	0.04 V or less
3	5 V	100.000 %	0.04 V or less
4	OFF	100.000 %	
5	5 V	100.000 %	3.8 V or more

2.11 Tests of the 10-CH, Medium-Speed Digital Output Module (MX125-MKC-M10)

Tests

2.11.1 Insulation Resistance Test
2.11.2 Withstanding Voltage Test
2.11.3 Digital Output Voltage Test

Instruments Used

Instrument	Standards, Recommended Products Etc.
MX100, MW100, or equivalent	MX100 or MW100 Main Module
	MX150 Base Plate
PC *	That the software required for the test is installed
Insulation resistance tester	DC500 V
Withstanding voltage tester	AC 1 kV–3 kV
DMM	M/7561 or equivalent

* Ensure that the module settings and measured values can be read in.

Cautions When Performing This Test

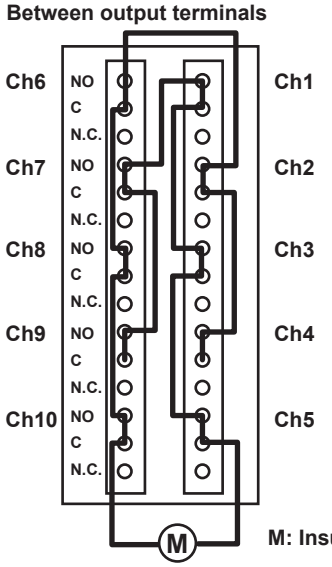
Connect to the PC only when performing the digital output test.

2.11.1 Insulation Resistance Test

For this test, the Ten-Channel, Medium-Speed Digital Output Module is installed with the MX100, MW100, or equivalent device.
When installing the DO module onto the main unit, always fasten with screws.

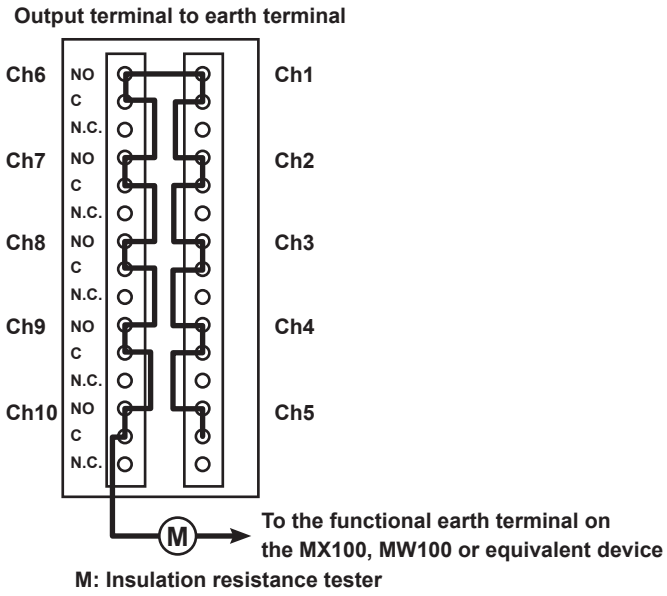
Procedure

1. Wire the instruments as shown below then measure the insulation resistance.



Measure the insulation resistance between the wire shorting the NO and C terminals of channels 1, 3, 5, 7, and 9, and the wire shorting the NO and C terminals of channels 2, 4, 6, 8, and 10.

The N.C. terminals are not connected.



Short the output terminals on all channels, and measure the insulation resistance between the functional earth terminals on the jig of the MX100, MW100, or equivalent.

The N.C. terminals are not connected.

2. Confirm that the criteria below are met.

Between output terminals:	DC500 V, 20 MΩ or more
Output terminal to earth terminal:	DC500 V, 20 MΩ or more

2.11.2 Withstanding Voltage Test

For this test, the Ten-Channel, Medium-Speed Digital Output Module is installed with the MX100, MW100, or equivalent device.
When installing the DO module onto the main unit, always fasten with screws.

Procedure

1. Perform the withstanding voltage test between each terminal in the same manner as test item 1 of in section 2.11.1, “Insulation Resistance Test.”
2. Confirm that the criteria below are met.

Between output terminals:	AC2300 Vrms for 1 minute, 2 mA or less
Output terminal to earth terminal:	AC2300 Vrms for 1 minute, 2 mA or less

2.11.3 Digital Output Test

For this test, the Ten-Channel, Medium-Speed Digital Output Module is installed with the MX100, MW100, or equivalent device.

Procedure

1. Turn ON/OFF output on the DO module using software such as the MX100 Standard Software, and measure the conduction resistance between the NO and C terminals on the corresponding output channel using a DMM.
2. Perform step 1 on all channels.
3. Confirm that the criteria below are met.

Syntax	Criteria
ON	1 Ω or less
OFF	1 MΩ or higher

2.12 Tests of the 10-CH Screw Terminal Block (772061)

Tests

2.12.1 Insulation Resistance Test
2.12.2 Withstanding Voltage Test
2.12.3 ID Check
2.12.4 Between-Channel Measurement Error Test
2.12.5 Reference Junction Compensation Accuracy Test

Instruments Used

Instrument	Standards, Recommended Products Etc.
Insulation resistance tester	Kikusui TOS-9201 or equivalent
Withstanding voltage tester	Kikusui TOS-9201 or equivalent
DMM	Agilent Technologies 3458A or equivalent DCV measurement accuracy: 0.005% of rdg + 1μV Resistance measurement accuracy: 0.005% of rdg + 1 mΩ
DC voltage generator*	FLUKE Datron 9100 or equivalent Output voltage 100 VDC or more
Rheostat	ALPHA Electronics ADR-1202 or equivalent 0 Ω ±1 mΩ (short) Other than 0 Ω, ±(0.006% of setting + 2 mΩ)
Temperature tank standardized at 0°C	Coper Electronics ZC-114 or equivalent
Thermocouple	Type T
MX100, MW100, or equivalent	MX100 or MW100 Main Module MX110-UNV-M10 module MX150 Base Plate 772062 cable
PC *	Includes software required for testing
Ethernet cable	

* Ensure that the DC voltage generator meets the following standards.
However, even if it meets the standards, voltage drops can occur as a result of output impedance, so the output voltage should always be monitored with a DMM.

Output Voltage	Standard
0 V	±1μV (obtain by shorting)
20 mV	±100 ppm
60 mV	±80 ppm
200 mV	±60 ppm
1 V	±60 ppm
2 V	±60 ppm
6 V	±60 ppm
20 V	±60 ppm
100 V	±60 ppm

2.12.1 Insulation Resistance Test

Perform a test using a DC 500 V insulation resistance tester and confirm that the standards below are met.

Procedure

Input Terminals to Earth Terminals

1. Short all terminals A, B, and b on channels 1 through 10, then measure the insulation resistance between the terminals and the screws on the rear panel.

Between Input Terminals

2. Measure the insulation resistance between a device whose terminals A and B on channels 1, 3, 5, 7, and 9 are all shorted and a device whose terminals A and B on channels 2, 4, 6, 8, and 10 are all shorted.
3. Confirm that the standards below are met.

Test Points	Standard
Between output terminals	DC500 V, 20 MΩ or more
Output terminal to earth terminal	DC500 V, 20 MΩ or more

2.12.2 Withstanding Voltage Test

Apply the AC voltages below in a withstanding voltage test, and confirm that no abnormalities occur.

Procedure

Input Terminals to Earth Terminals

1. Short all terminals A, B, and b on channels 1 through 10, then perform a withstanding voltage test between the terminals and the screws on the rear panel. Apply the voltage below, and confirm that no abnormalities occur.
   Leakage of 2 mA or less at 3.7 kVrms AC for 1 minute

Between Input Terminals

2. Perform a withstanding voltage test between a device whose terminals A and B on channels 1, 3, 5, 7, and 9 are all shorted and a device whose terminals A and B on channels 2, 4, 6, 8, and 10 are all shorted. Apply the voltage below, and confirm that no abnormalities occur.
   Leakage current of 1 mA or less at 1.0 kVrms AC for 1 minute

2.12.3 ID Check

Procedure

1. Attach the terminals of the product to be measured.
2. Turn the power OFF.
3. Turn the power ON.
4. Confirm that the terminal block is correctly identified.

2.12.4 Between-Channel Measurement Error Test

Procedure

1. Connect the A and B terminals on all channels to a voltage generator or variable resistor.
2. Set the measurement interval on the module being tested to 500 ms.
3. Confirm that the measured values for each channel are within the criteria.

Range	Input	Criteria
20 mV	Short input H to L	0.000±0.005 mV
Cu10 GE	9.036 Ω	0.0±2.0°C

2.12.5 Reference Junction Compensation Accuracy Test

Always use terminal covers.

Procedure

1. Allow a warm-up of 30 minutes or more.
2. Measure the 0°C standardized temperature tank at the range for Type-T thermocouples.
3. Measure at all channels, and confirm that the result lies within 0°C ± 0.5°C.

2.13 Tests of the Plate with Clamp Terminals (772063)

Tests

2.13.1 Insulation Resistance Test
2.13.2 Withstanding Voltage Test
2.13.3 ID Check
2.13.4 Between-Channel Measurement Error Test
2.13.5 Reference Junction Compensation Accuracy Test

Instruments Used

Same as section 2.12, “772061 10-ch Screw Terminal Block.”

2.13.1 Insulation Resistance Test

Same as section 2.12, “772061 10-ch Screw Terminal Block.”
However, when applying voltages to input terminal to earth, do so on the MX100 or equivalent. Also, after attaching the module to the base plate, always fasten with screws.

2.13.2 Withstanding Voltage Test

Same as section 2.12, “772061 10-ch Screw Terminal Block.”
However, when applying voltages to input terminal to earth, do so on the MX100 or equivalent. Also, after attaching the module to the base plate, always fasten with screws.

2.13.3 ID Check

Same as section 2.12, “772061 10-ch Screw Terminal Block.”

2.13.4 Between-Channel Measurement Error Test

Same as section 2.12, “772061 10-ch Screw Terminal Block.”

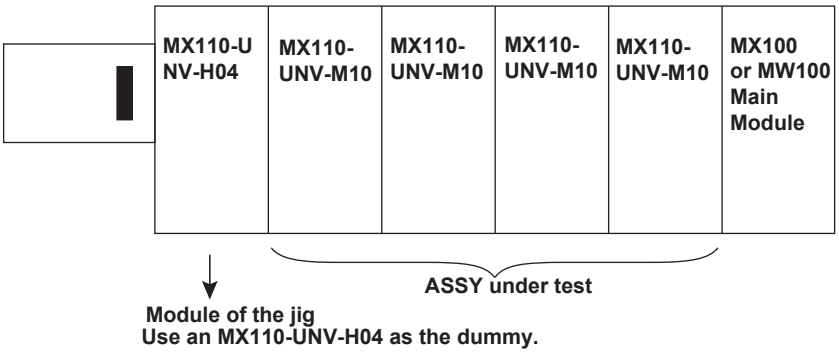
2.13.5 Reference Junction Compensation Accuracy Test

Always use terminal covers.

Procedure

1. Allow a warm-up of 30 minutes or more.
2. As shown in the figure below, use slots 0 through 4 and install the dummy module in the outer-most slot.

Example: When testing 4 modules at once



3. Measure the 0°C standardized temperature tank at the range for Type-T thermocouples. Measure on channel 4, and confirm that the result lies within 0°C ± 0.5°C.

2.14 Tests of the Plate with M3 Screw Terminals (772080)

Install the MX110-UNV-M10 10-CH, Medium-Speed Universal Module before performing these tests. The tests to be performed are the same as for the MX110-UNV-M10 10-CH, Medium-Speed Universal Module.

3.1 Adjusting the RJC Board

The following RJC Boards can be adjusted.

H04 RJC Board Assembly	B8720TH
M10 RJC Board Assembly	B8720TJ

Adjustment of the RJC BOARDs requires a special adjustment jig. For information about the adjustment jig and procedure, contact your nearest Yokogawa representative.

4.1 Introduction

This chapter describes possible solutions for rectifying errors. Insuch case, assembly removal may be required.
Please heed the following warning.

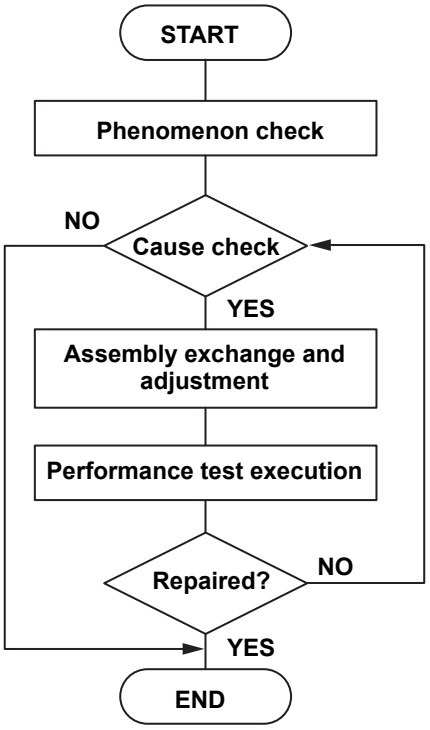
WARNING

Assemblyu replacement is to be performed only by qualified service technicians who have experience working with the hazards involved (such as fire and electrical shock).

Note

If an error message is desplayed, the error may have been caused by incorrectly operating the unit. Refer to the user's manual (IM MX100-01E or IM MW100-01E), and perform the correct operation.

4.2 Flow Chart



4.3 Troubleshooting Checklist

Contact your nearest Yokogawa representative if module adjustment is required.

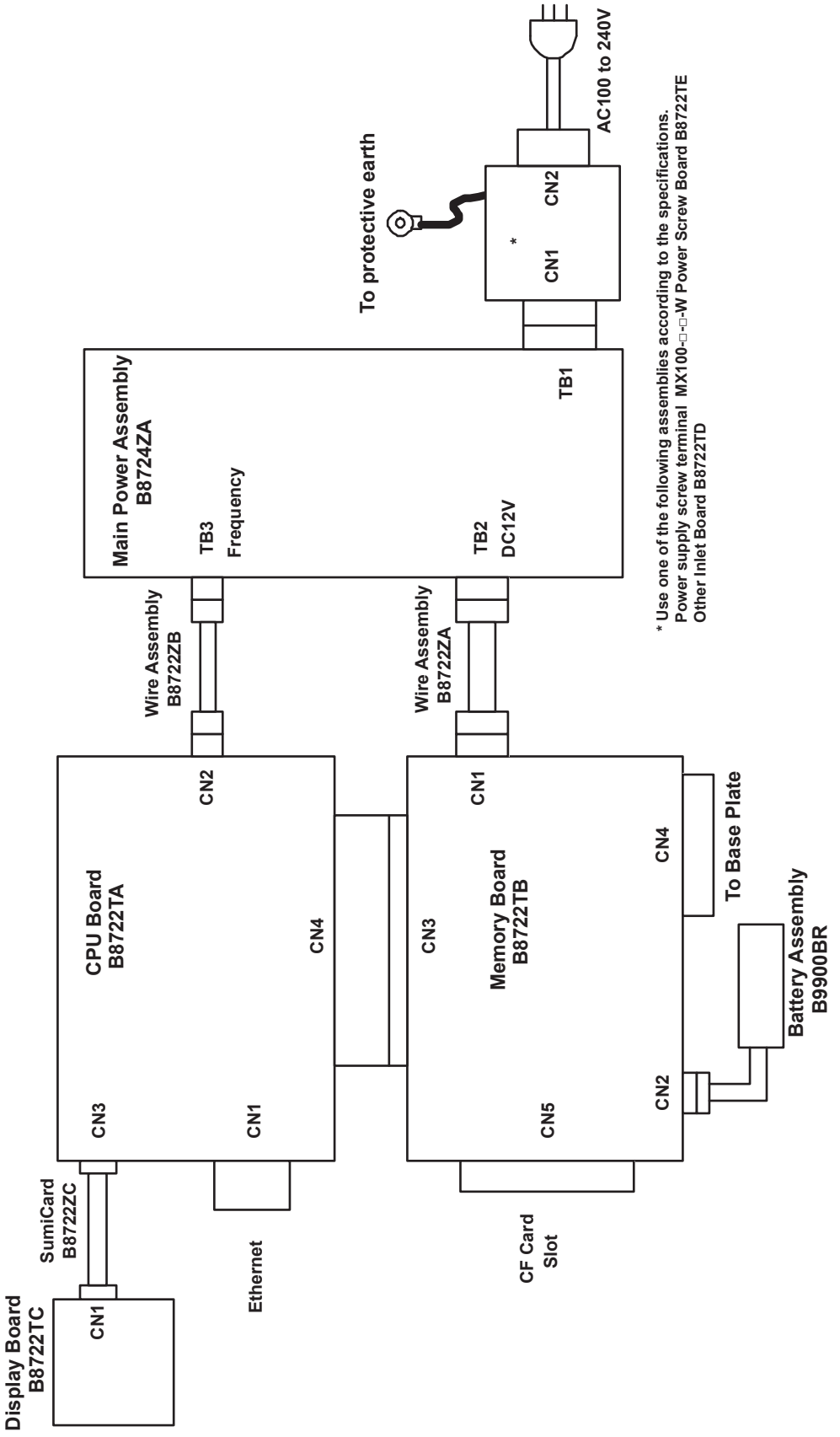
Trouble	Action	Item	Relevant Modules
Power not ON (LED does not light)	Check	Connect the power cable	MX100, MW100
	Check	Power supply switch is not ON	MX100, MW100
	Check	Power supply voltage is low	MX100, MW100
	Check/replace	Wire Assy (Power-CPU) Inlet Board Assembly	MX100, MW100
	Replace	Power Screw Board Assy (fuse blown)	MX100, MW100
	Replace	Power Assembly	MX100, MW100
	Replace	CPU Board Assembly	MX100, MW100
	Replace	Memory Board Assembly	MX100, MW100
	Replace	Driver Board Assembly	MW100
	Replace	Display Board Assembly	MX100, MW100
	Check/replace	Sumicard	MX100, MW100
FAIL State (Error display)	Check	Dip switch setting	MX100, MW100
	Replace	CPU Board Assembly	MX100, MW100
	Replace	Memory Board Assembly	MX100, MW100
	Replace	Display Board Assembly	MX100, MW100
	Replace	Driver Board Assembly	MW100
	Check/replace	Sumi-card	MX100, MW100
	Replace	I/O Module	
	Check/replace	CF Card	MX100, MW100
	Check/replace	Battery (Connectors connected, battery voltage is 3 V or less)	MX100, MW100
	Check	Multiple connections	MX100, MW100
Cannot connect to the PC	Check	Ethernet Cable	MX100, MW100
	Check	Hub	MX100, MW100
	Check	PC (Network Card)	MX100, MW100
	Check	Network settings (IP address, subnet mask, default gateway)	MX100, MW100
	Replace	CPU Board Assembly	MX100, MW100
	Replace	Memory Board Assembly	MX100, MW100
	Replace	Display Board Assembly	MX100, MW100
	Replace	Display Board Assembly	MX100, MW100
	Check/replace	Sumi-card	MX100, MW100
Connected I/O module not detected	Replace	I/O Module	MX100, MW100
	Replace	Base Plate	MX100
	Replace	CPU Board Assembly	MX100
	Replace	Memory Board Assembly	MX100
	Replace	Driver Board Assembly	MX100, MW100

4.3 Troubleshooting Checklist

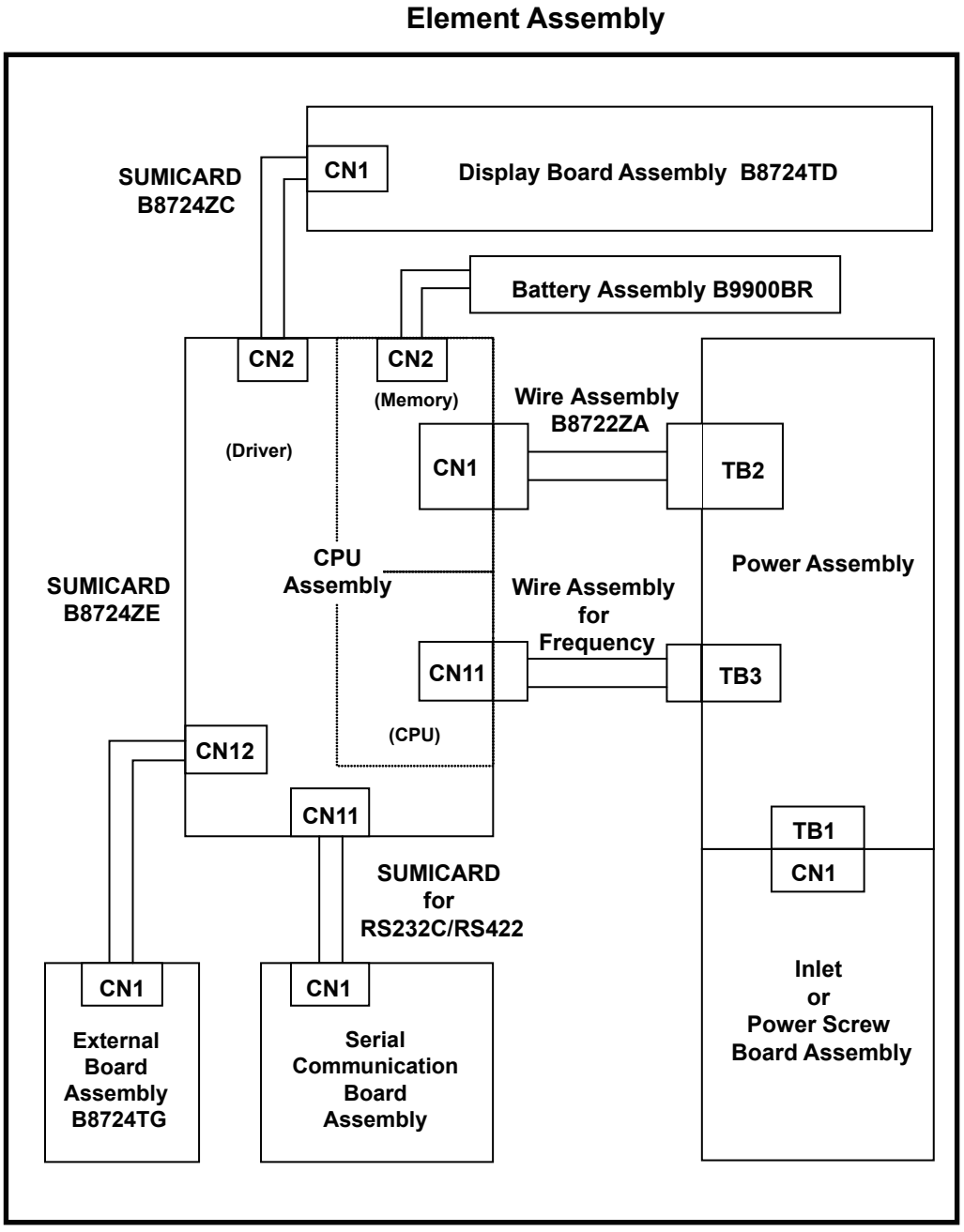
Trouble	Action	Item	Relevant Modules
Not detected	Check	Connector connection to the base plate	All
	Adjust	Calibration error	MX100
	Replace	H04 Input CTRL Board	MX110-UNV-H04
	Replace	H04 Input PWR Board	MX110-UNV-H04
	Replace	H04 Input AD Board	MX110-UNV-H04
	Replace	4WRTD Ctrl Board Assembly	MX110-V4R-M06
	Replace	M10 Input Contorl Board	MX110-UNV-M10
	Replace	Strain Ctrl Board Assembly	MX112
	Replace	DI Power Board	MX115
	Replace	AO Power Board Assembly	MX120-VAO-M08
	Replace	AO Ctrl Board Assembly	MX120-VAO-M08
	Replace	PWM Ctrl Board Assembly	MX120-PWM-M08
	Replace	PWM Power Board Assembly	MX120-PWM-M08
	Replace	DO Power Board	MX125
Measured values not correct	Check	Input wire connection	All except DO
	Check	Noise	All except DO
	Adjust/replace	H04 Input CTRL Board	MX110-UNV-H04
	Adjust replace	H04 Input PWR Board	MX110-UNV-H04
	Adjust replace	H04 Input AD Board	MX110-UNV-H04
	Adjust replace	M10 Input Contorl Board	MX110-UNV-M10
	Replace	M10 Scanner Board	MX110-UNV-M10
	Replace	DCVDI Terminal Board	MX110-UNV-M10
	Replace	DI Power Board	MX110-UNV-M10
	Replace	DO Power Board	MX110-UNV-M10
	Adjust/replace	Strain Ctrl Board	MX112
	Replace	Strain Clamp Scan Board	MX112-B12-M04
	Replace	STR CRP TM 120 Board	MX112-B12-M04
	Replace	STR Clamp Scan Board	MX112-B35-M04
	Replace	STR CRP TM 350 Board	MX112-B35-M04
	Replace	STR NDIS Scan Board	MX112-NDI-M04
	Replace	DI Power Board	MX115
	Replace	DI Input Board	MX115-D05-H10
	Replace	24VDI Input Board	MX115-D05-H10
	Replace	DCVDI Terminal Board	MX115-D24-H10
Measured temperature not correct	Check	Input wire connection	MX110
	Check	Thermocouple or resistance bulb type setting	MX110
	Check	Noise	MX110
	Check	Terminal cover not attached	MX110
	Check	RJC INT/EXT setting	MX110
	Check	RTD wire resistances are not equal	MX110
	Adjust/replace	H04 Input CTRL Board	MX110-UNV-H04
	Adjust/replace	H04 Input PWR Board	MX110-UNV-H04
	Adjust/replace	H04 Input AD Board	MX110-UNV-H04
	Replace	H04 RJC Board	MX110-UNV-H04
	Adjust/replace	M10 Input Contorl Board	MX110-UNV-M10
	Replace	M10 Scanner Board	MX110-UNV-M10
	Replace	DCVDI Terminal Board	MX110-UNV-M10
	Replace	M10 RJC Board	MX110-UNV-M10
	Adjust/replace	4WRTD Ctrl Board	MX110-V4R-M06
	Replace	4WRTD Scanner Board	MX110-V4R-M06
	Replace	4WRTD Term Board	MX110-V4R-M06

Trouble	Action	Item	Relevant Modules
Fluctuation in the measured value	Check	Power supply frequency and integration time do not match	MX110
	Replace	4WRTD CTRL Board	MX110-V4R-M06
	Replace	4WRTD Scanner Board	MX110-V4R-M06
	Replace	4WRTD Terminal Board	MX110-V4R-M06
	Check/replace	Wire Assembly (Power-CPU) Power supply frequency detection	MX100
	Check	Noise	MX110
	Replace	H04 Input CTRL Board	MX110-UNV-H04
	Replace	H04 Input PWR Board	MX110-UNV-H04
	Replace	H04 Input AD Board	MX110-UNV-H04
	Replace	H04 RJC Board	MX110-UNV-H04
	Replace	M10 Input Contorl Board	MX110-UNV-M10
	Replace	M10 Scanner Board	MX110-UNV-M10
	Replace	DCVDI Terminal Board	MX110-UNV-M10
	Replace	M10 RJC Board	MX110-UNV-M10
	Replace	Strain Ctrl Board	MX112
	Replace	Strain Clamp Scan Board	MX112-B12-M04
	Replace	STR CRP TM 120 Board	MX112-B12-M04
	Replace	STR Clamp Scan Board	MX112-B35-M04
	Replace	STR CRP TM 350 Board	MX112-B35-M04
	Replace	STR NDIS Scan Board	MX112-NDI-M04
	Replace	Terminal Assembly	MX112-NDI-M04
	Replace	DI Power Board	MX115
	Replace	DI Input Board	MX115-D05-H10
	Replace	24VDI Input Board	MX115-D24-H10
	Replace	DCVDI Terminal Board	MX115-D24-H10
Contact output does not output	Replace	DO Power Board	MX125
	Replace	DO Relay Board	MX125
The output value is not correct	Replace	AO Power Board Assembly	MX120-VAO-M08
	Replace	AO Ctrl Board Assembly	MX120-VAO-M08
The output pulse interval and duty amplitude are not correct	Replace	PWM Ctrl Board Assembly	MX120-PWM-M08
	Replace	PWM Power Board Assembly	MX120-PWM-M08

5.1 Schematic Diagram of MX100 Main Module



5.2 Schematic Diagram of MW100 Main Module

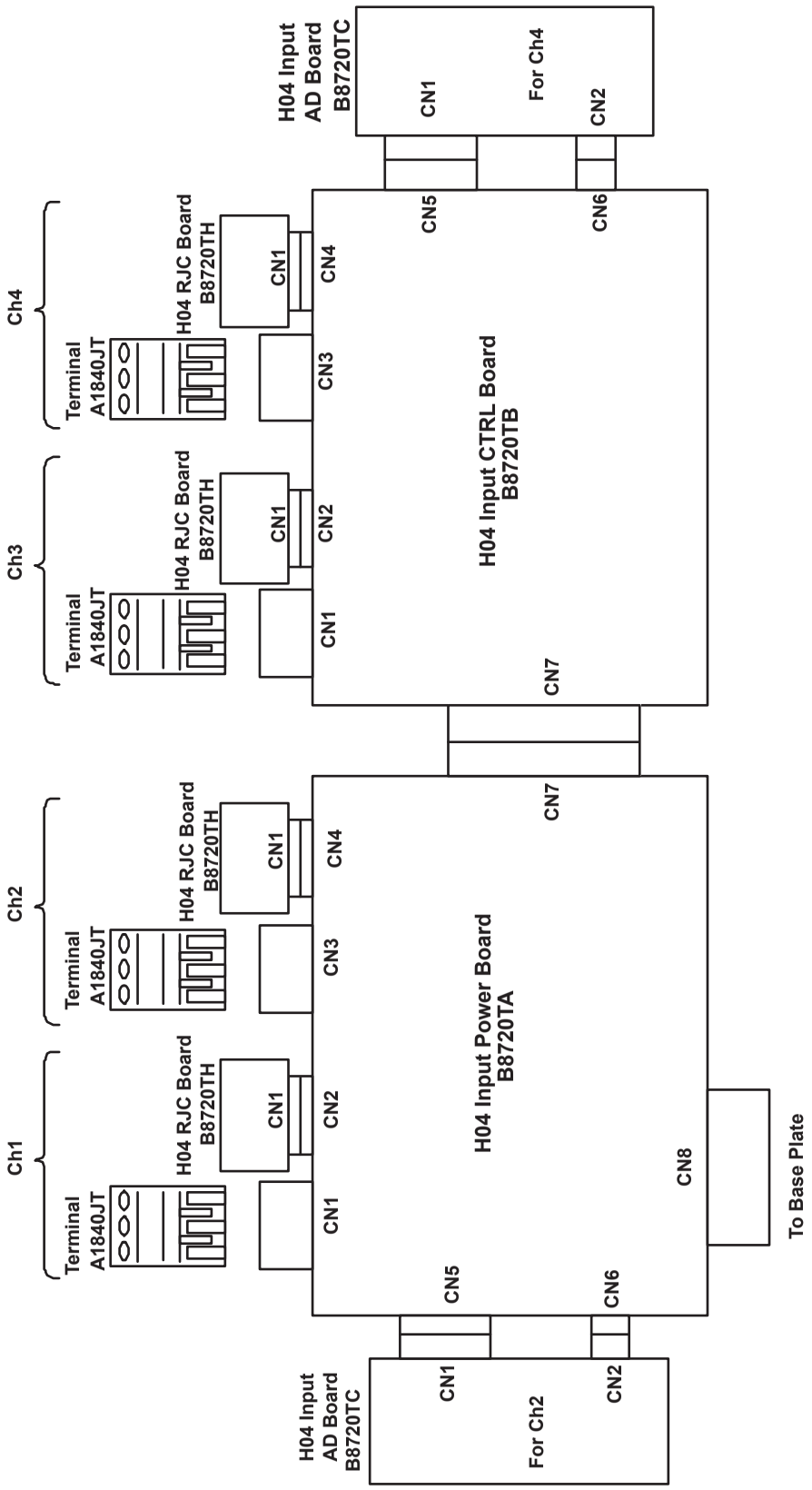


MW100 spesification		Element Assembly	CPU Assembly	Power Assembly	Wire Assembly for DC12V	Wire Assembly for Frequency	Inlet or Power Screw Board Assembly
Power spesifications	Communication spesifications*						
AC Inlet	None	B8724CA	B8724CL	B8724CP	B8722ZA	B8722ZB	B8724TM
	C3	B8724CB	B8724CM				
	C2	B8724CC	B8724CN				
AC Screw	None	B8724CD	B8724CL				B8724TN
	C3	B8724CE	B8724CM				
	C2	B8724CF	B8724CN				
DC Screw	None	B8724CG	B8724CL	B8724CQ		None	B8724TH
	C3	B8724CH	B8724CM				
	C2	B8724CJ	B8724CN				

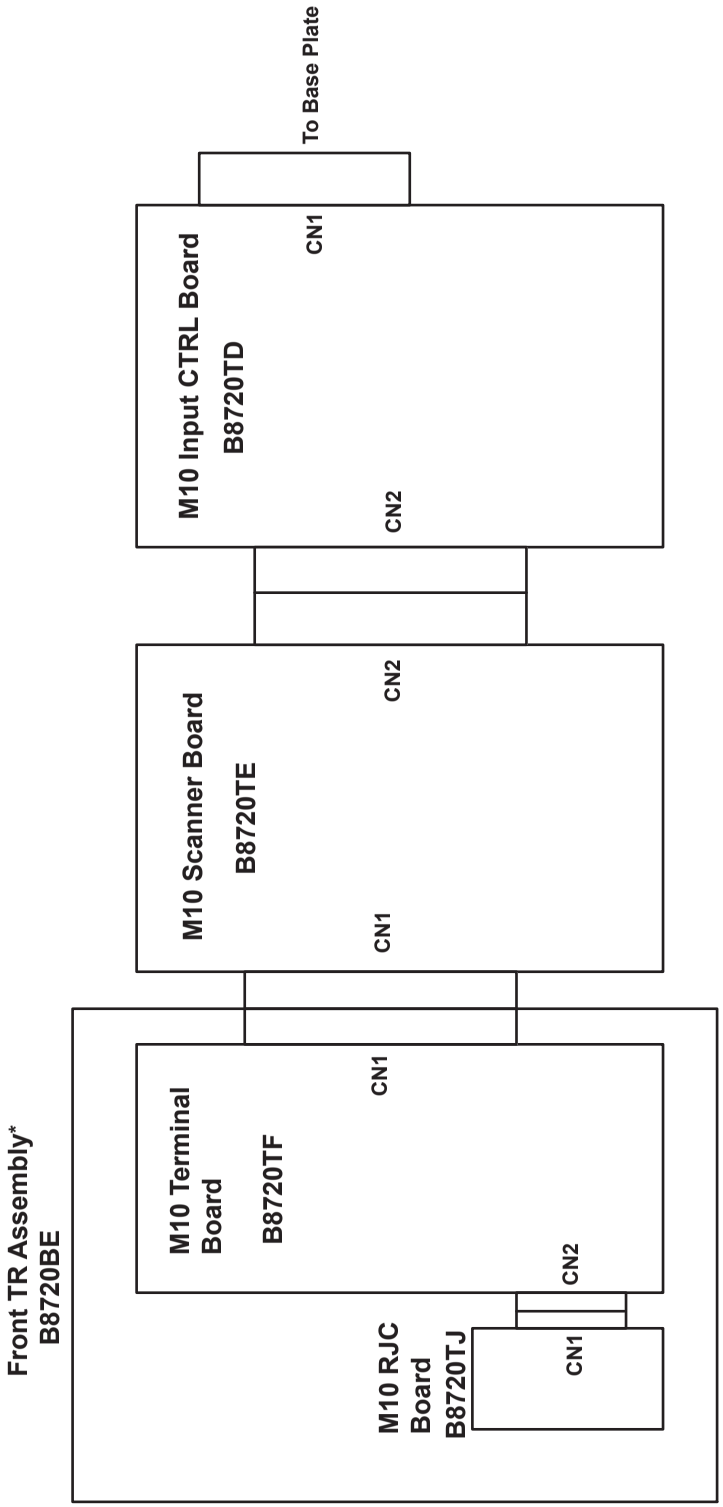
MW100 spesification		Element Assembly	Serial Communication Board Assembly	SUMICARD for RS232C/422
Power spesifications	Communication spesifications*			
AC Inlet	None	B8724CA	None	None
	C3	B8724CB	B8724TF	B8724ZD
	C2	B8724CC	B8724TE	
AC Screw	None	B8724CD	None	None
	C3	B8724CE	B8724TF	B8724ZD
	C2	B8724CF	B8724TE	
DC Screw	None	B8724CG	None	None
	C3	B8724CH	B8724TF	B8724ZD
	C2	B8724CJ	B8724TE	

* Communication specifications
C2: RS-232
C3: RS-422A/485

5.3 Schematic Diagram of MX110 4-CH, High-Speed Universal Input Module (MX110-UNV-H04)

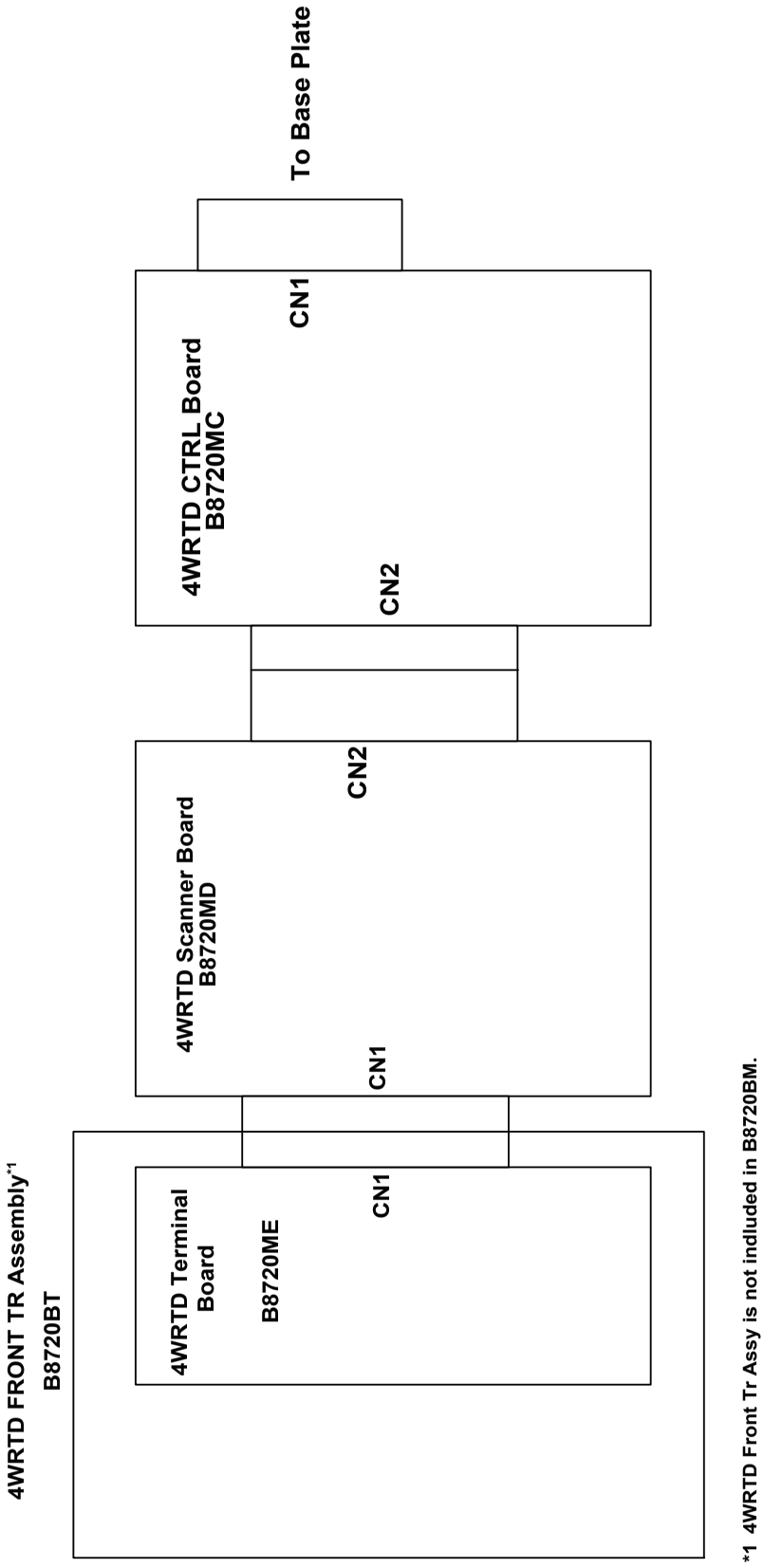


5.4 Schemaic Diagram of MX110 10-CH, Meduim-Speed Universal Input Module (MX110-UNV-M10)



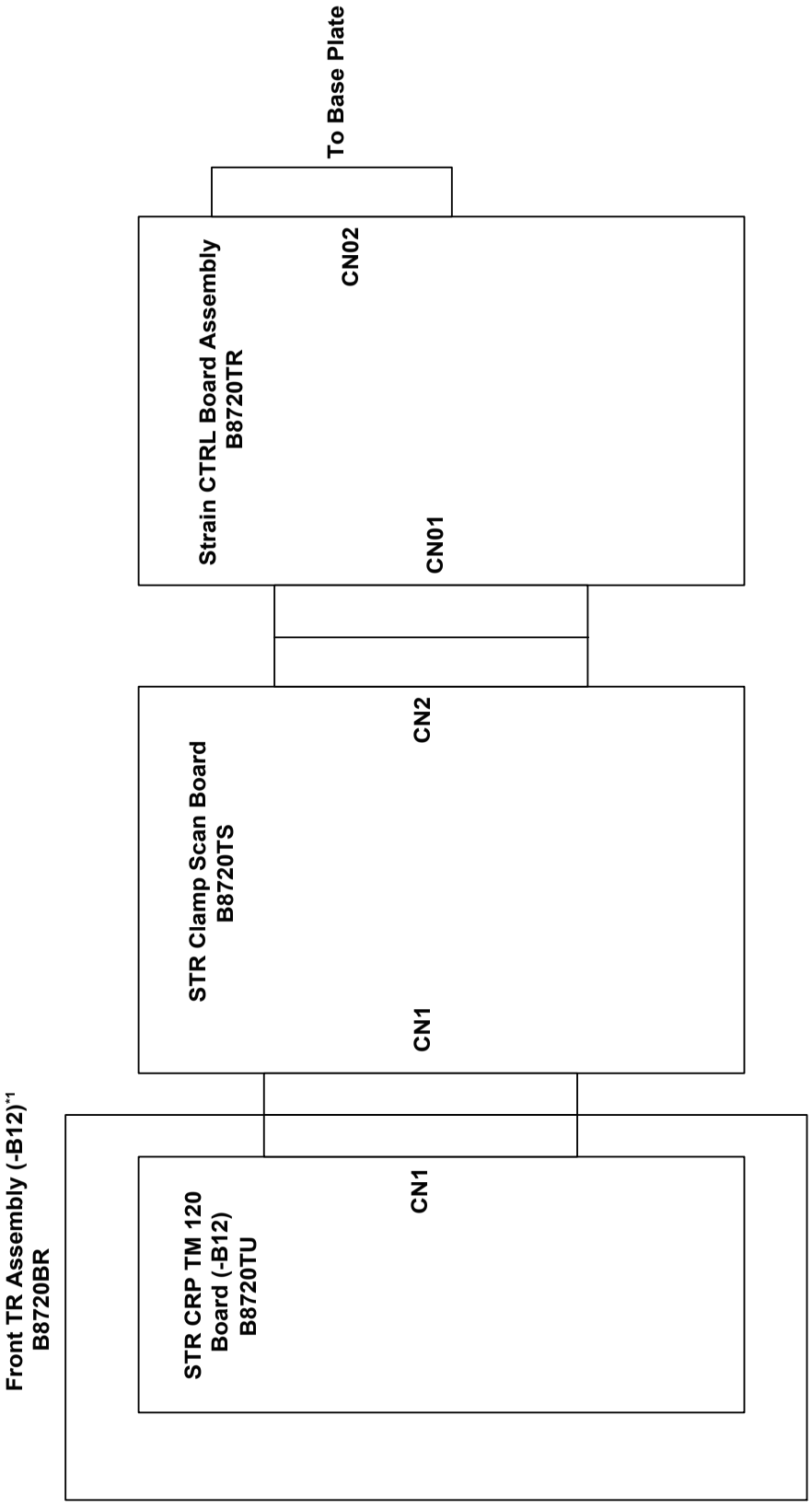
* The Front TR Assembly (push terminal assembly) is not included in B8720BB.
Not installed when the /NC option is specified.

5.5 Schematic Diagram of 6-CH, Medium-Speed Four-Wire RTD Resistance Input Module (MX110-V4R-M06)

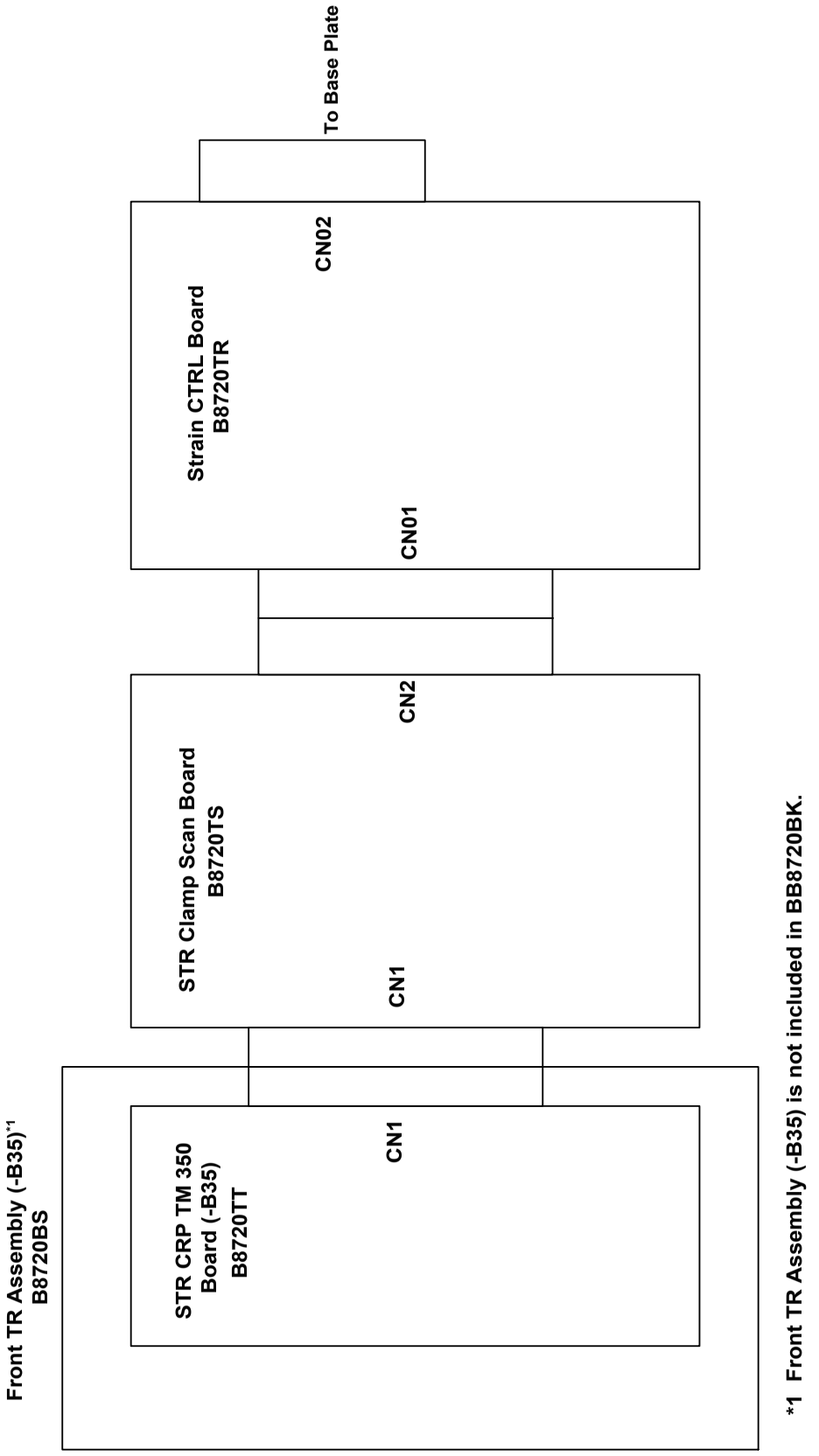


5.6 Schematic diagram of 4-CH, Medium-Speed Strain Input Module (MX112-B12/B35/NDI-M04)

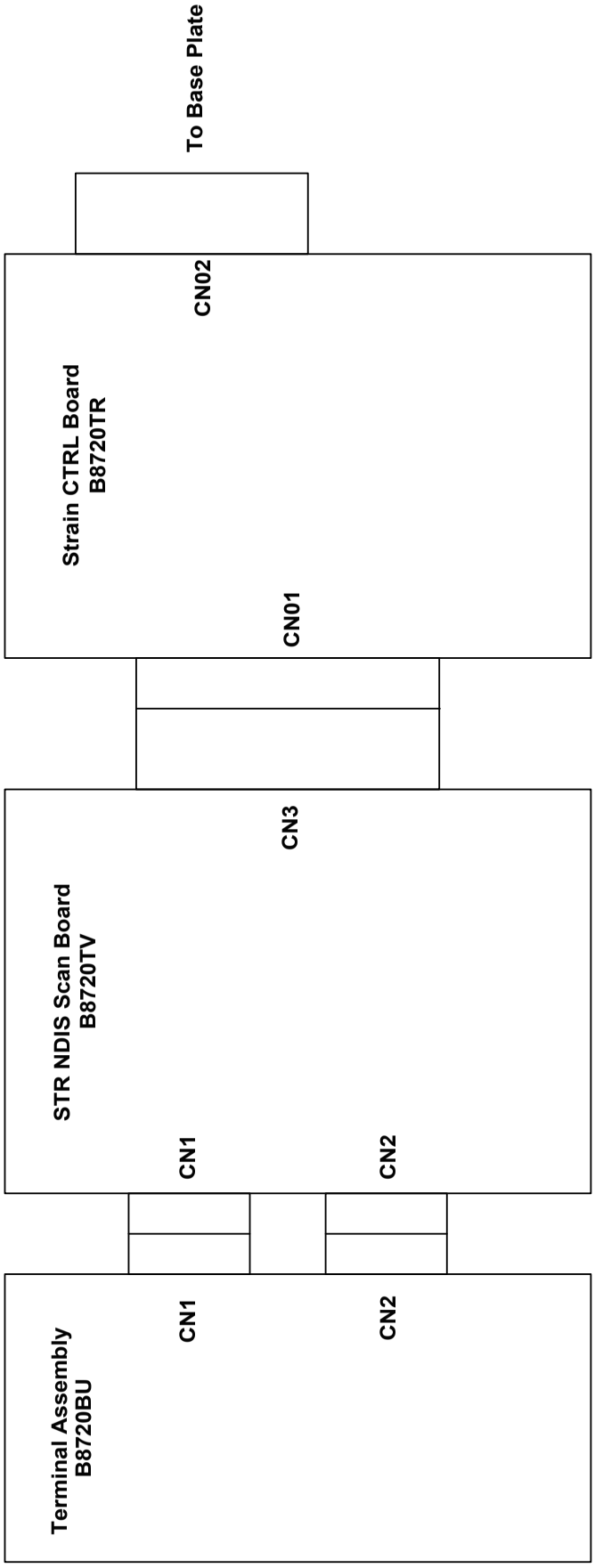
MX112-B12-M04



MX112-B35-M04

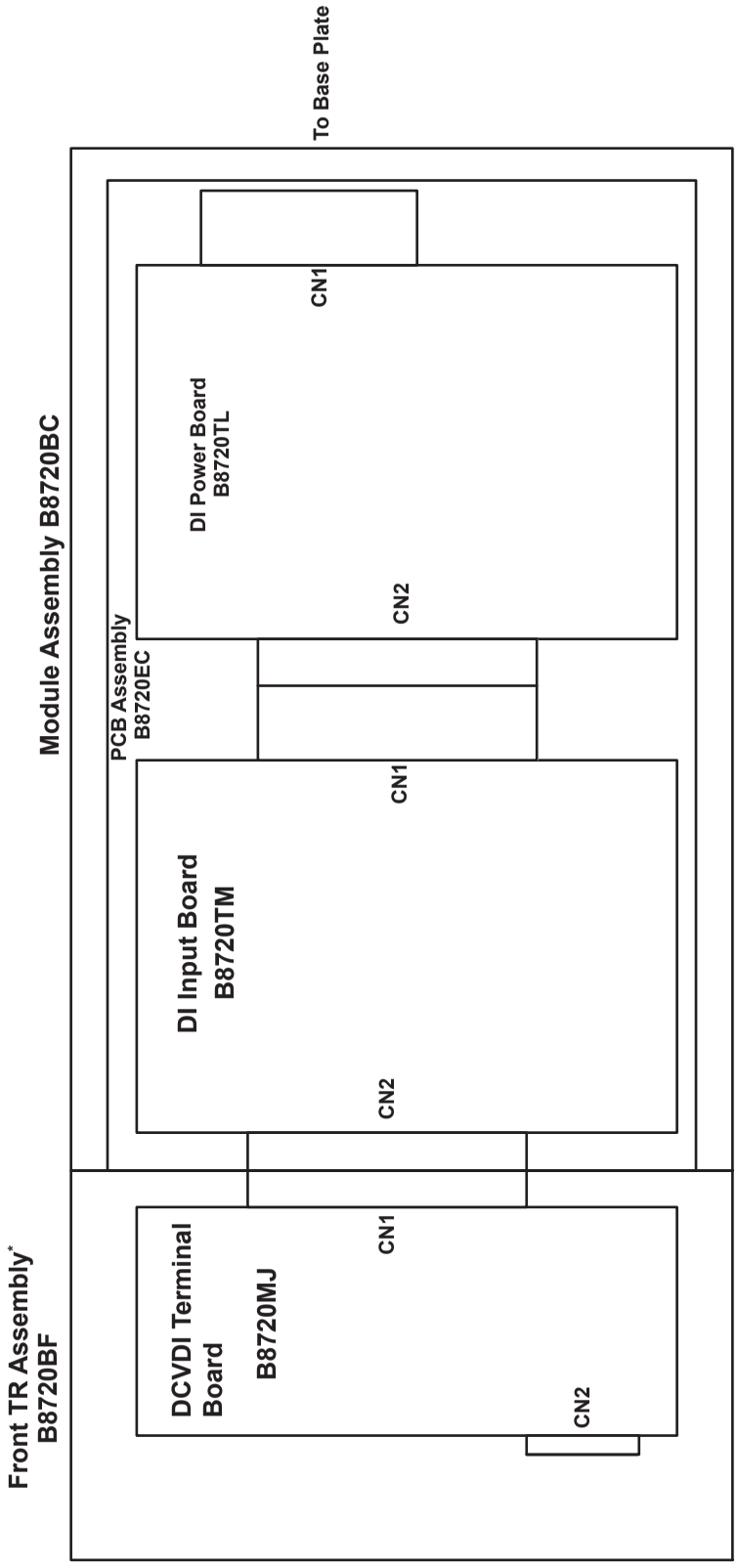


MX112-NDI-M04



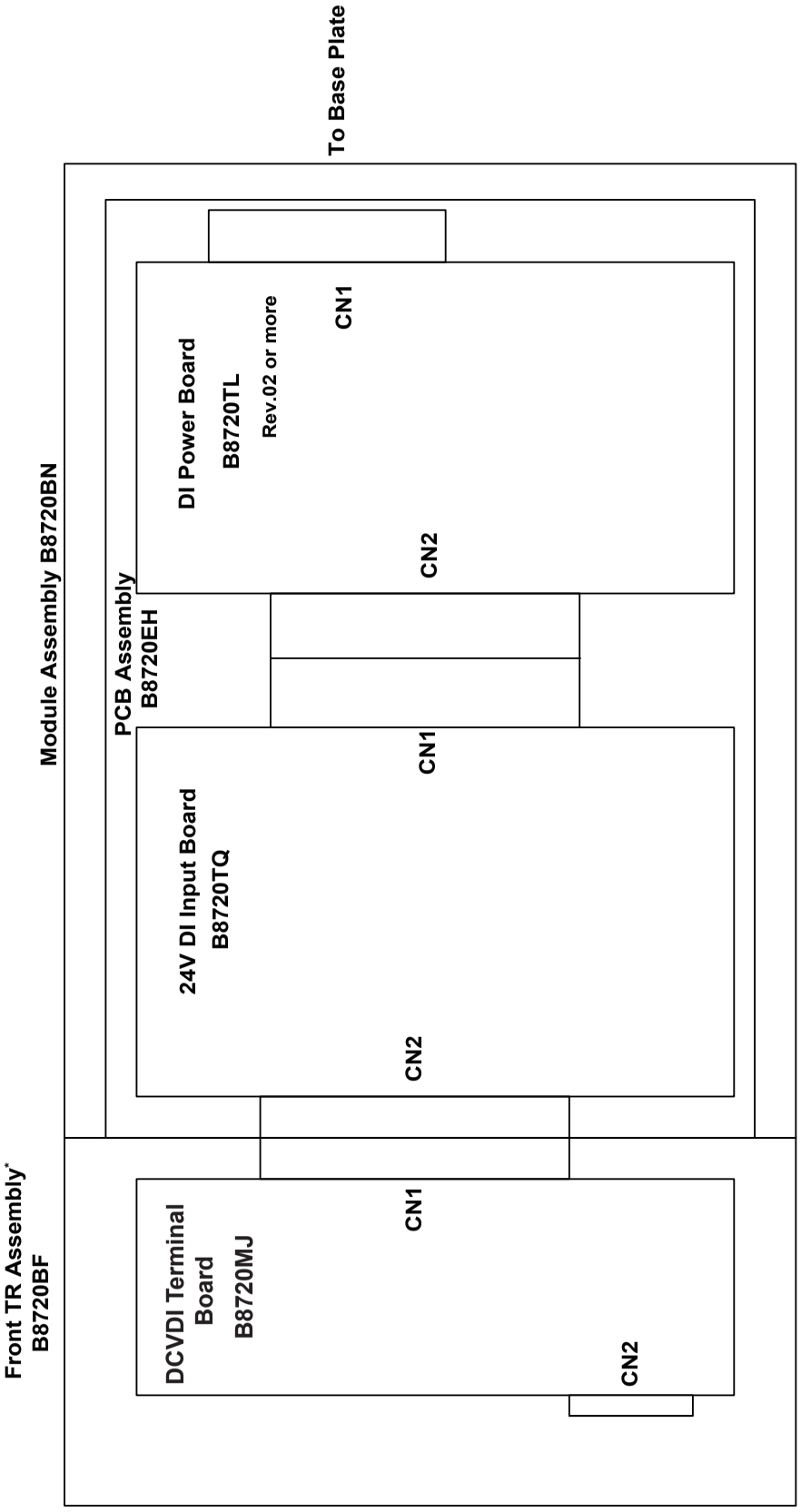
5.7 Schematic Diagram of 10-CH, High-Speed Digital Input Module (MX115-D05/D24-M10)

MX115-D05-M10



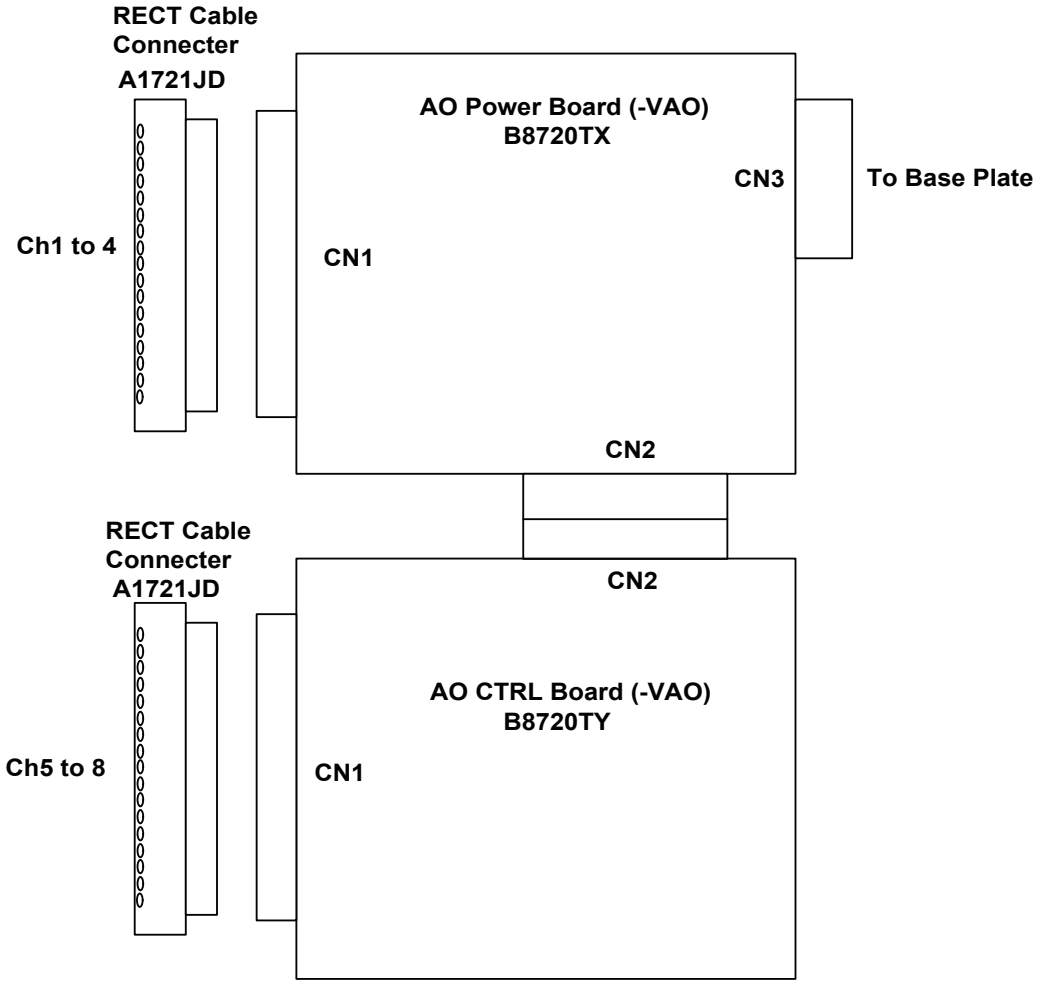
* The Front TR Assembly (push terminal assembly) is not included in B8720BC.
Not installed when the /NC option is specified.

MX115-D24-M10

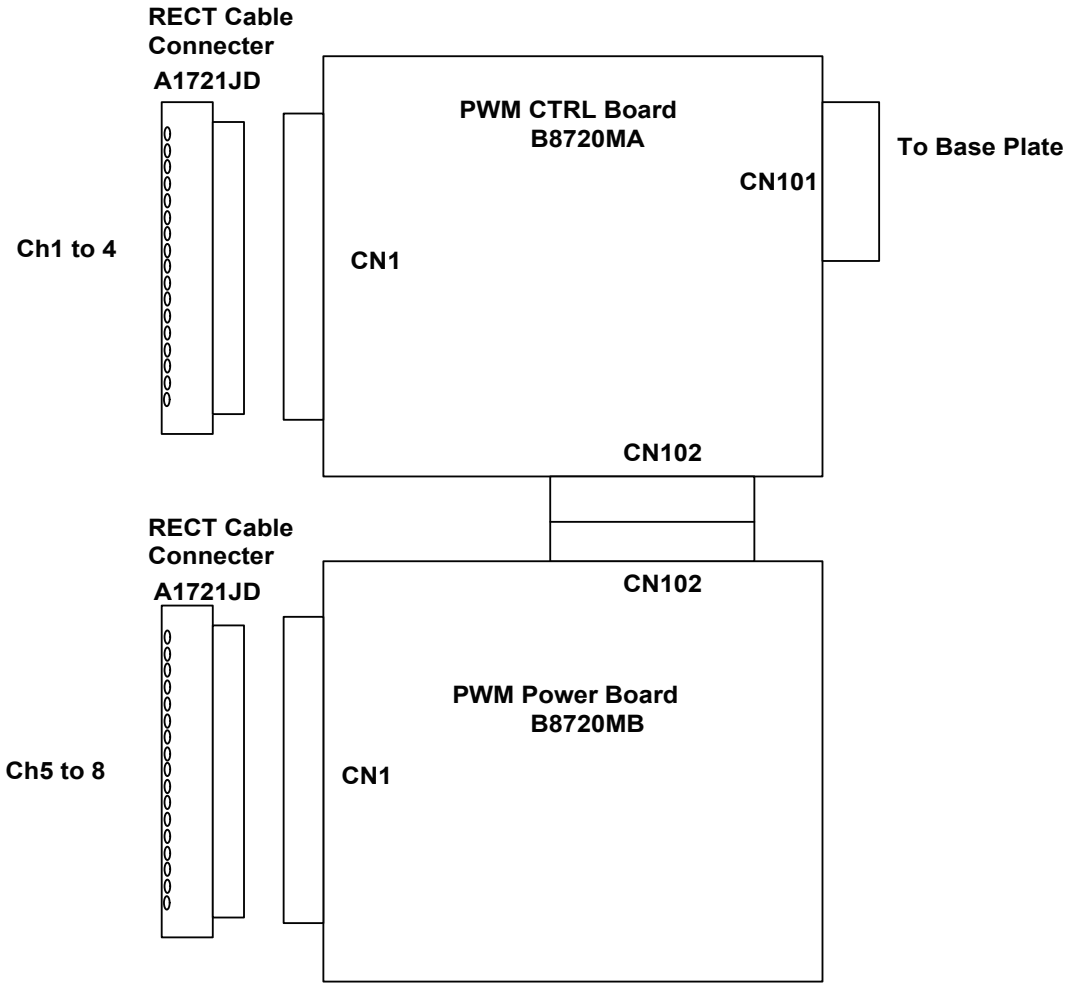


* The Front TR Assembly (push terminal assembly) is not included in B8720BN.
Not installed when the /NC option is specified.

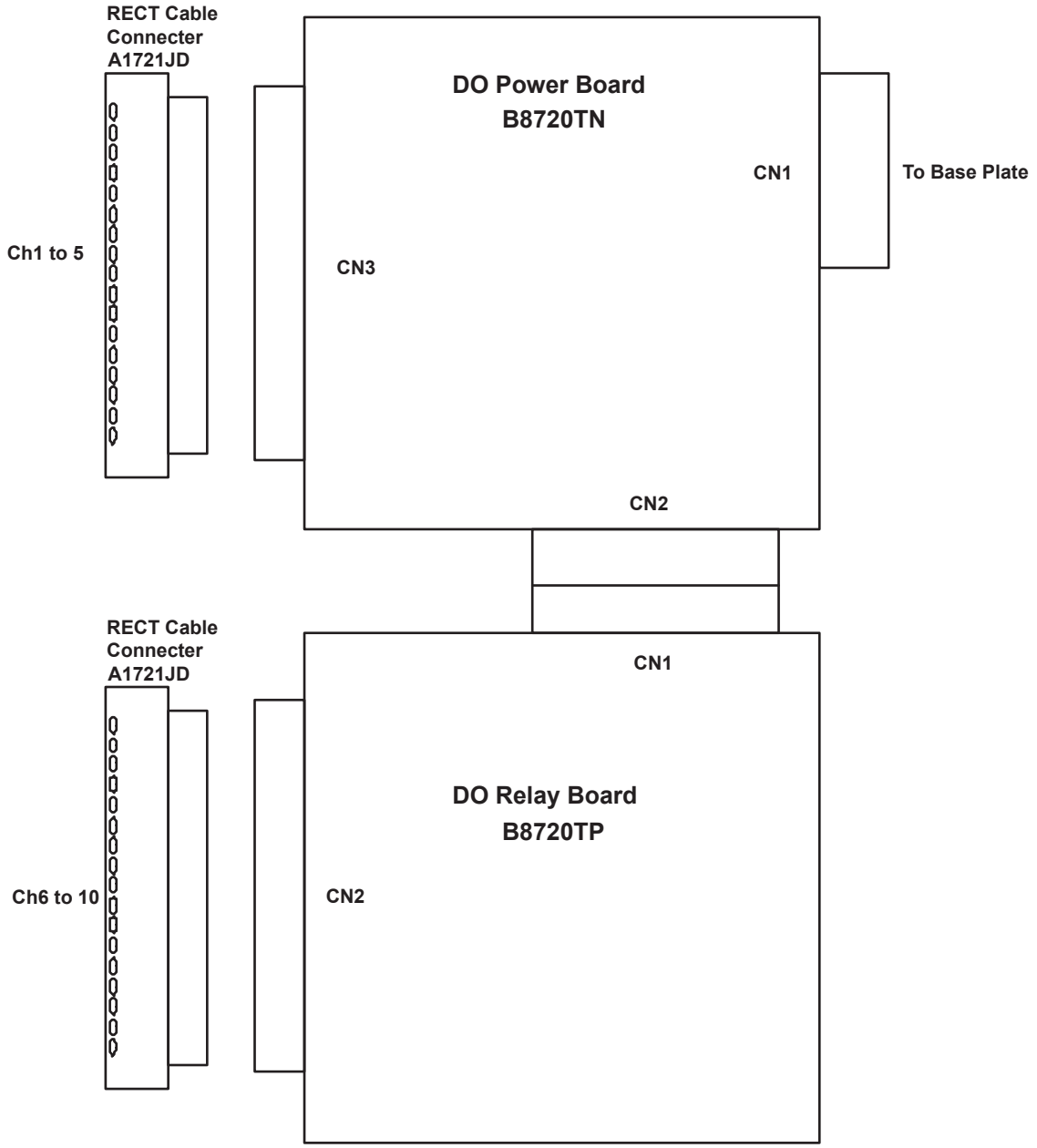
5.8 Schematic Diagram of 8-CH, Medium-Speed Analog Output Module (MX120-VAO-M08)



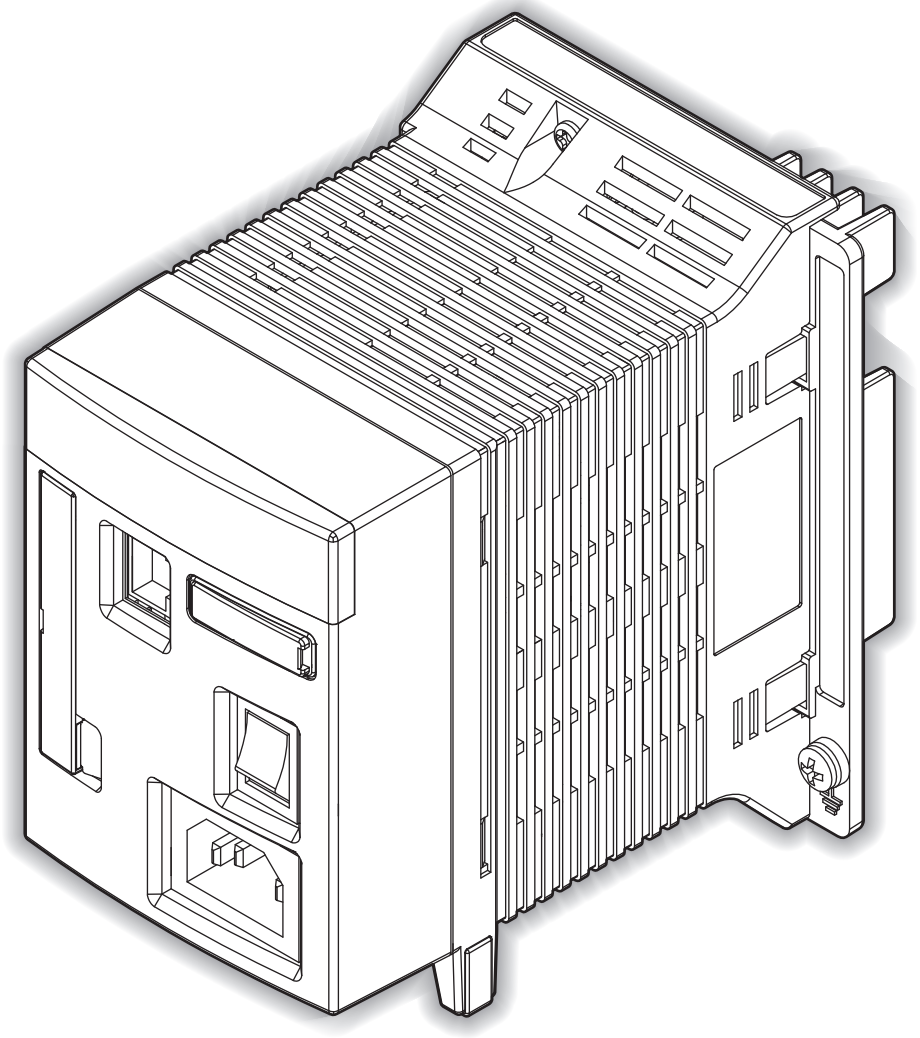
5.9 Schematic Diagram of 8-CH, Medium-Speed PWM Output Module (MX120-PWM-M08)



5.10 Schematic Diagram of 10-CH, Medium-Speed Digital Output Module (MX125-MKC-M10)



6.1 MX100 Main Module Customer Maintenance Parts List



Note:

- **Parts marked with a ◎symbol are Customer Maintenance Parts (CMP).**
- **The contents of this CMPL are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.**

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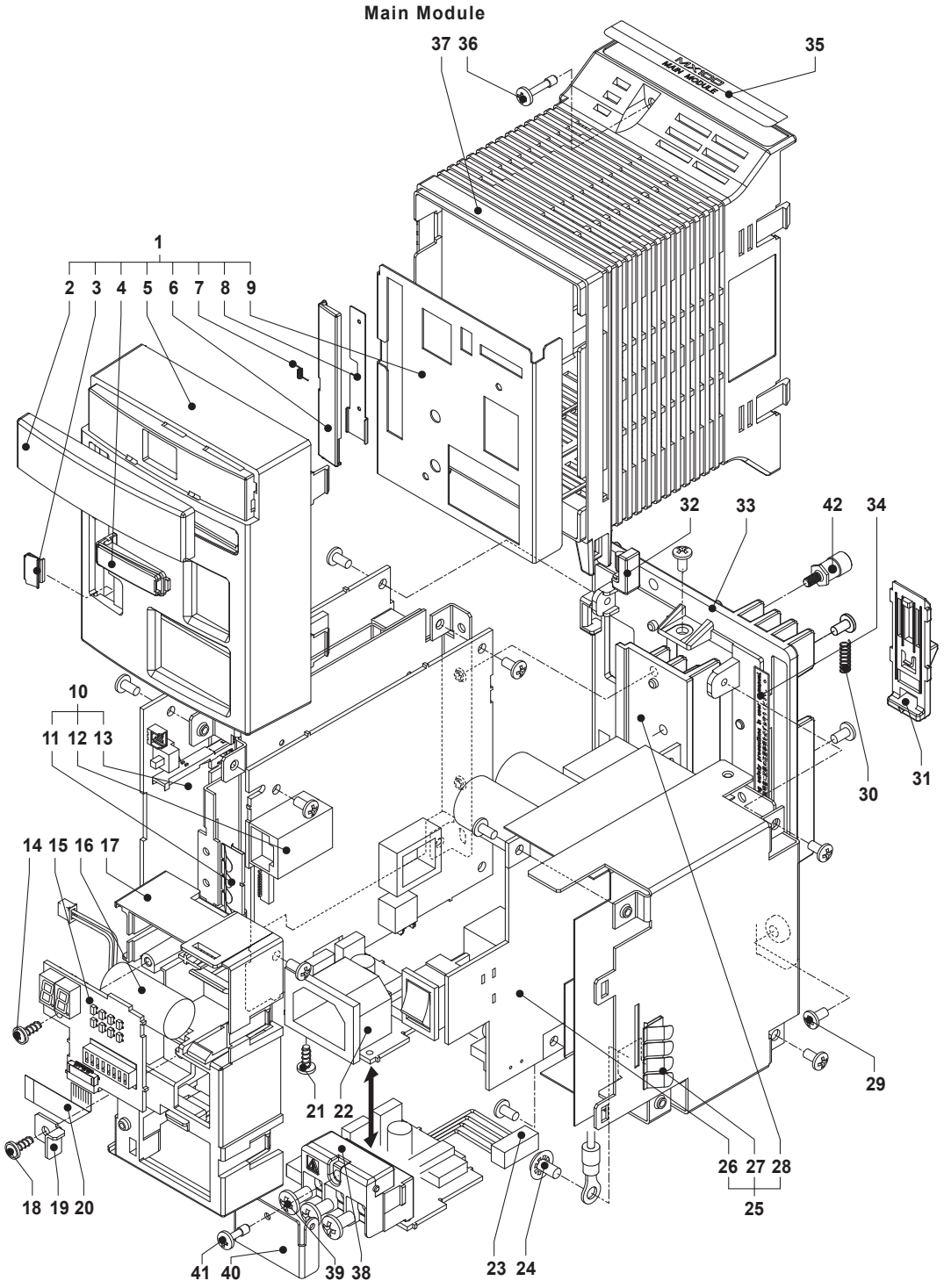

Main Module
37 36
35
1
2 3 4 5 6 7 8 9
32 33 42 34
10
11 12 13
30
31
14 15 16 17
29
21 22
26 27 28
25
18 19 20
41 40 39 38
23 24

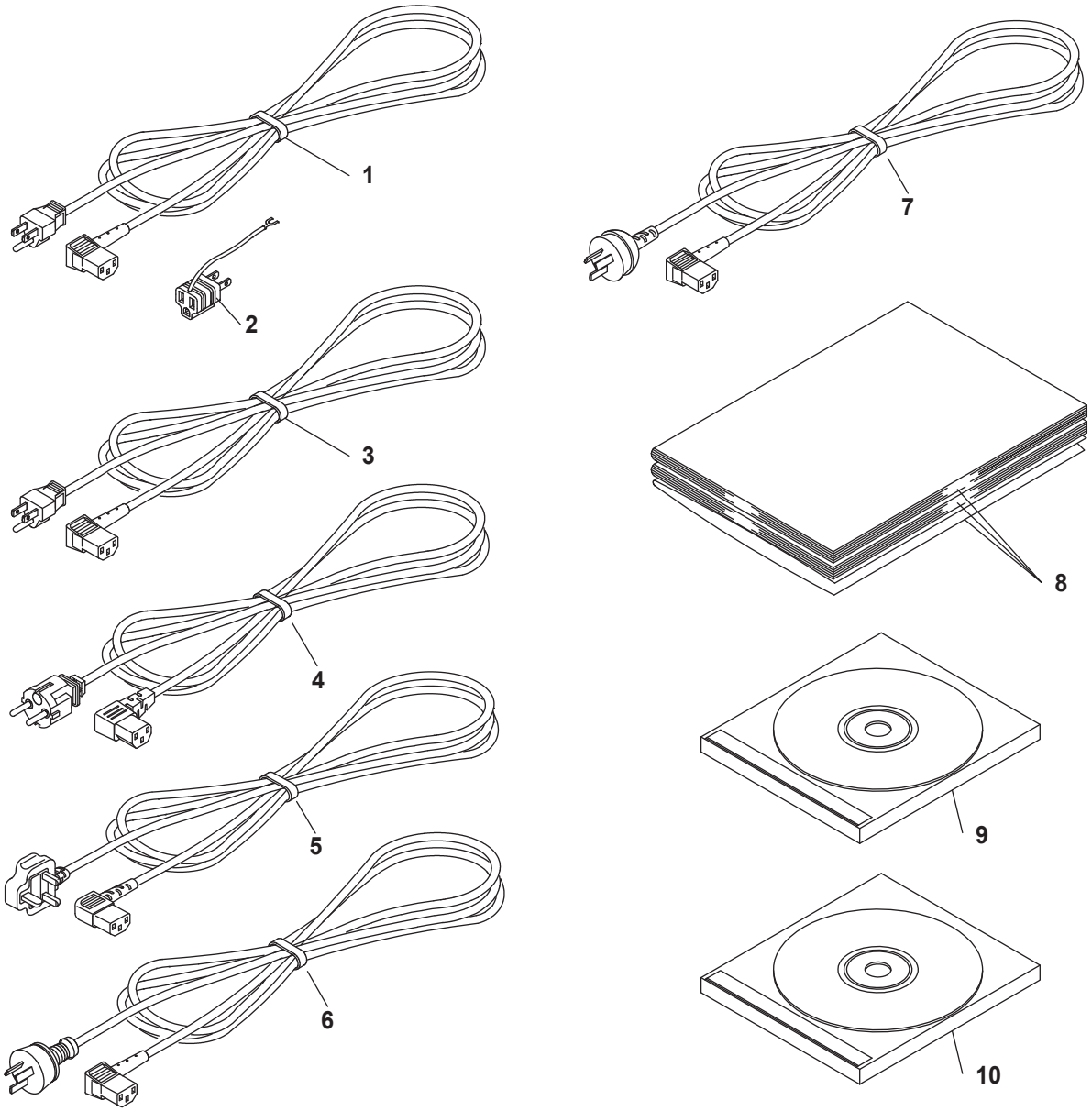
Main Module

Item	Part No.	Qty	Description
1	B8722CE	1	Bezel Assembly
◎ 2	B8722CJ	1	Filter
3	B8722EJ	1	Bracket
◎ 4	B8722DQ	1	Cap
5	B8722CH	1	CPU Bezel
6	B8722DE	1	Door
7	B8722EL	1	Spring
8	B8722EK	1	Bracket
9	B8722ET	1	Bracket
10	B8722CC	1	CPU Assembly
11	B9968GU	2	Shield Finger
12	B8722TA	1	CPU Board
13	B8722TB	1	Memory Board
14	B9988DL	1	Screw
15	B8722TC	1	Display Board
16	B9900BR	1	Battery Assembly
17	B8722DC	1	Adapter
18	B9988DL	1	Screw
19	B8722EN	1	Bracket
20	B8722ZC	1	Sumicard
21	B9988DL	1	Screw
22	B8722TD	1	Inlet Board (not -W)
23	B8722ZA	1	Wire Assembly
24	Y9406LK	1	B,H,Screw.M4x6 (with toothed lockwasher)
25	B8722CD	1	Power Assembly
26	B8724ZA	1	AC Power Assembly
27	B9968GU	2	Shield Finger
28	B8722DN	1	Heat Think
29	Y9406LS	1	B,H,Screw.M4x6
◎ 30	B8722EH	1	Spring
◎ 31	B8722DF	1	Latch
◎ 32	B8722DR	2	Foot
33	B8722DM	1	CPU Back Plate
◎ 34	B8722CL	1	Label
◎ 35	B8722CK	1	Label
◎ 36	B8722EM	1	Screw
37	B8722DA	1	CPU Case
38	B8722TE	1	Power Screw Board (-W)
◎ 39	E9655FX	3	Screw (-W)
◎ 40	B8722DV	1	TR Cover (-W)
◎ 41	B9900SG	1	Screw (-W)
◎ 42	B8720HH	1	Stud

Note: ◎ (CMP)

6.2 MX100 Main Module Standard Accessories

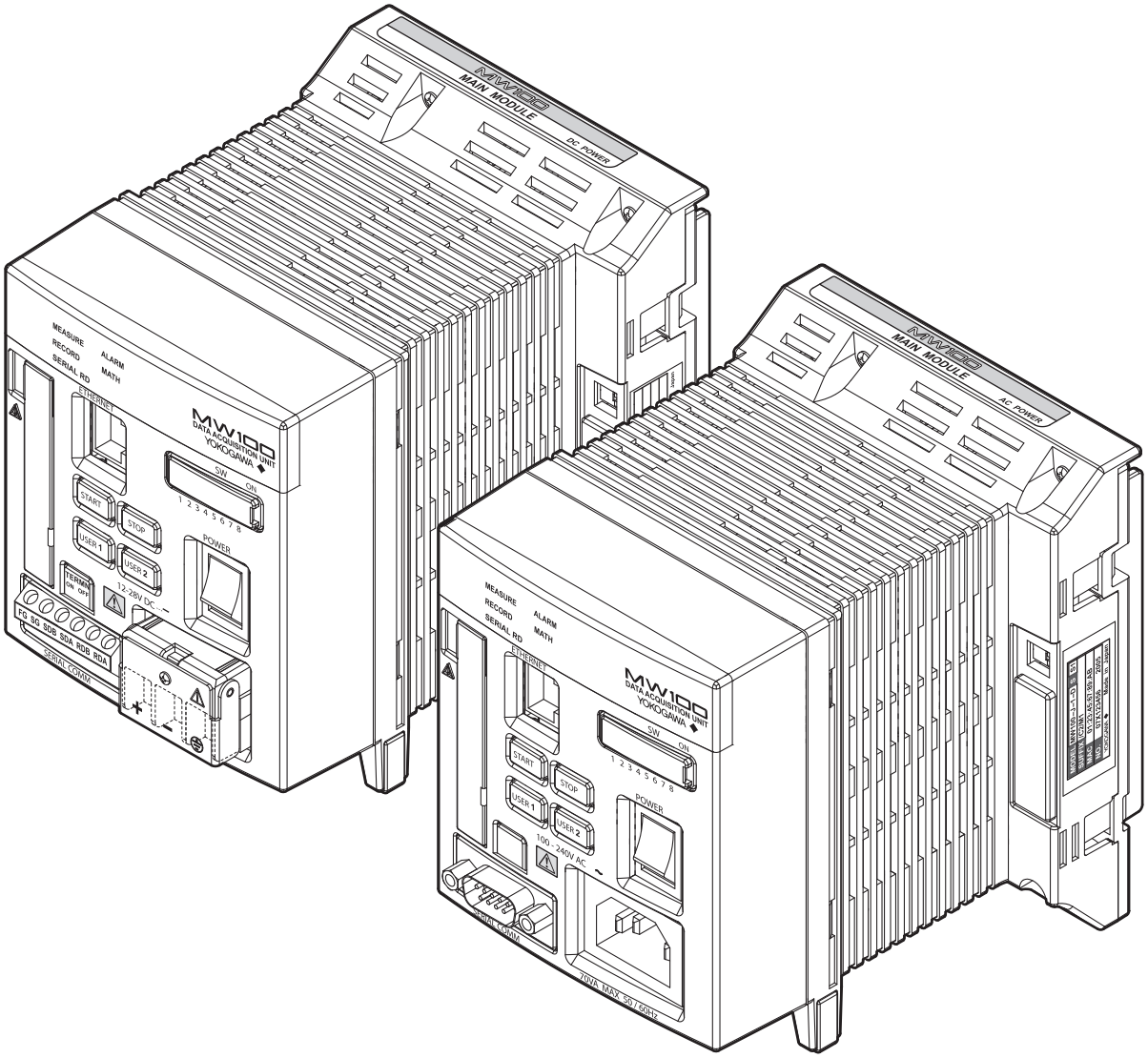
Standard Accessories



Item	Part No.	Qty	Description	
◎ 1	A1073WD	1	Power Supply Code	(Suffix code -M*, UL.CSA standard)
◎ 2	A1253JZ	1	3P-2P Adapter	
◎ 3	A1074WD	1	Power Supply Code (Suffix code -D, UL.CSA standard)	(select)
◎ 4	A1009WD	1	Power Supply Code (Suffix code -F, VDE standard)	
◎ 5	A1054WD	1	Power Supply Code (Suffix code -Q, BS standard)	
◎ 6	A1024WD	1	Power Supply Code (Suffix code -R, AS standard)	
◎ 7	A1064WD	1	Power Supply Code (Suffix code -H, CCC standard)	
8	IM MX100-02E	1	MX100 Data Acquisition Unit Operation Guide	
	IM MX100-71E	1	Precautions on the Use of the MX100 Data Acquisition Unit	
	IM MX100-72E	1	MX100 Data Acquisition Unit Installation and Connection Guide	
◎ 9	B8722XH	1	MX100 Manual CD-ROM	
◎ 10	MX180	1	MX100 Standard Softwear	

Note: * For use in Japan only, Suffix code-M
◎ CMP

6.3 MW100 Main Module Customer Maintenance Parts List



Note:

- **Parts marked with a ◎symbol are Customer Maintenance Parts (CMP).**
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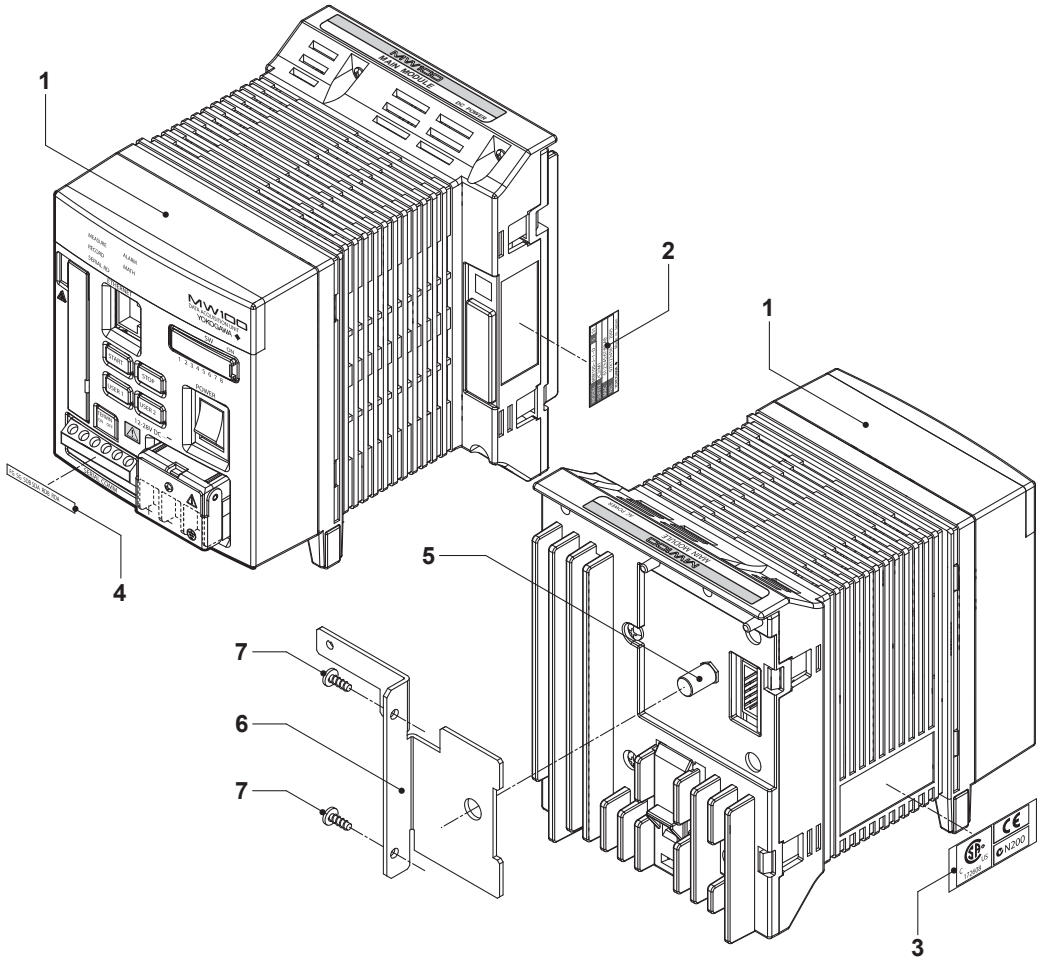
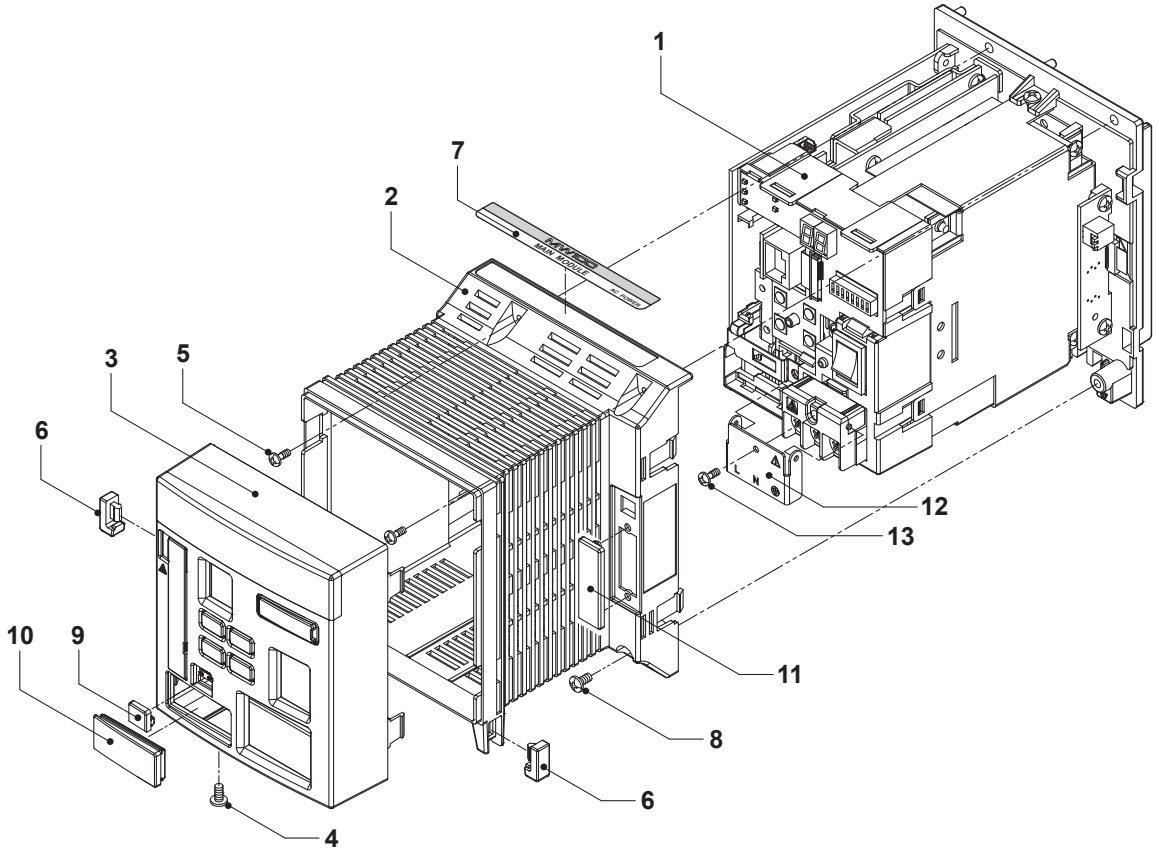
Complete Set



Item	Part No.	Qty	Description	MS CODE Power	Cord	Option	
1	B8724BA	1	Module Assembly	1	D,F,H,M,Q,R	–	
	B8724BB	1	Module Assembly	1	D,F,H,M,Q,R	C3	
	B8724BC	1	Module Assembly	1	D,F,H,M,Q,R	C2	
	B8724BD	1	Module Assembly	1	W	–	
	B8724BE	1	Module Assembly	1	W	C3	
	B8724BF	1	Module Assembly	1	W	C2	(select)
	B8724BG	1	Module Assembly	2	D,F,H,M,Q,R	–	
	B8724BH	1	Module Assembly	2	D,F,H,M,Q,R	C3	(see page 6-7)
	B8724BJ	1	Module Assembly	2	D,F,H,M,Q,R	C2	
	B8724BG	1	Module Assembly	3	W	–	
	B8724BH	1	Module Assembly	3	W	C3	
	B8724BJ	1	Module Assembly	3	W	C2	
2	–	1	Name Plate				
3	–	1	Label				
◎ 4	B8724AB	1	Label (/C3)				
◎ 5	B8720HH	(1)	Stud (Element Assembly) (see page 6-8)				
◎ 6	B8724EF	(1)	Bracket } (Accessories) (see page 6-10)				
◎ 7	B9988DL	(2)	Screw }				

Note:
◎ (CMP)

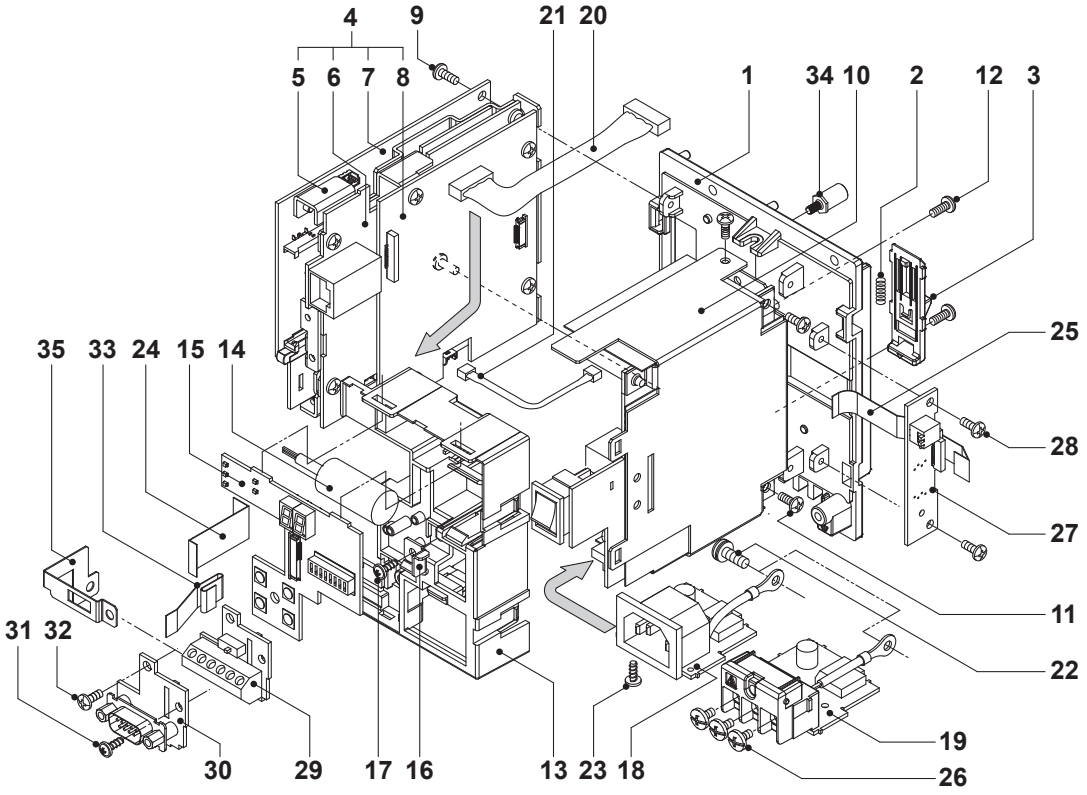
Module Assembly



Item	Part No.	Qty	Description	MS CODE Power	Cord	Option		
1	B8724CA	1	Element Assembly	1	D,F,H,M,Q,R	–	*1	(select) (see page 6-8)
	B8724CB	1	Element Assembly	1	D,F,H,M,Q,R	C3	*2	
	B8724CC	1	Element Assembly	1	D,F,H,M,Q,R	C2	*3	
	B8724CD	1	Element Assembly	1	W	–	*4	
	B8724CE	1	Element Assembly	1	W	C3	*5	
	B8724CF	1	Element Assembly	1	W	C2	*6	
	B8724CG	1	Element Assembly	2	D,F,H,M,Q,R	–	*7	
	B8724CH	1	Element Assembly	2	D,F,H,M,Q,R	C3	*8	
	B8724CJ	1	Element Assembly	2	D,F,H,M,Q,R	C2	*9	
	B8724CG	1	Element Assembly	3	W	–	*10	
	B8724CH	1	Element Assembly	3	W	C3	*11	
	B8724CJ	1	Element Assembly	3	W	C2	*12	
2	B8724DA	1	Case					
3	B8724CR	1	Bezel Assembly (*1,*2,*3,*4,*5,*6)					(select) (see page 6-9)
	B8724CS	1	Bezel Assembly (*7,*8,*9,*10,*11,*12)					
◎ 4	Y9306LS	1	Screw					
◎ 5	B8722EM	2	Screw					
◎ 6	B8722DR	2	Foot					
7	B8724DM	1	Label (*1,*2,*3,*4,*5,*6)					(select)
	B8724DN	1	Label (*7,*8,*9,*10,*11,*12)					
◎ 8	Y9406LS	1	Screw					
◎ 9	B8724DJ	1	Cover (*1,*3,*4,*6,*7,*9,*10,*12)					
◎ 10	B8724DK	1	Cover (*1,*4,*7,10)					
◎ 11	B8724DL	1	Cover					
◎ 12	B8722DV	1	TR Cover (*4,*5,*6)					(select)
◎	B8724DP	1	TR Cover (*7,*8,*9,*10,*11,*12)					
◎ 13	B9900SG	1	Screw (*4,*5,*6,*7,*8,*9,*10,*11,*12)					

Note:
◎ (CMP)

Element Assembly



Item	Part No.	Qty	Description
1	B8724DG	1	Back Plate
◎ 2	B8722EH	1	Spring
◎ 3	B8722DF	1	Lacth
4	B8724CL	1	CPU Assembly (*1,*4,*7,*10)
	B8724CM	1	CPU Assembly (*2,*5,*8,*11) } (select)
	B8724CN	1	CPU Assembly (*3,*6,*9,*12)
5	B8724EA	1	Bracket Assembly
6	B8724TA	1	CPU Board Assembly
7	B8724TB	1	Memory Board Assembly
8	B8724TC	1	Driver Board Assembly (*1,*4,*7,*10)
	B8724TK	1	RS422A Driver Board (*2,*5,*8,*11) } (select)
	B8724TJ	1	RS232C Driver Board (*3,*6,*9,*12)
9	Y9306LS	3	Screw
10	B8724CP	1	Power Assembly (*1,*2,*3,*4,*5,*6)
	B8724CQ	1	Power Assembly (*7,*8,*9,*10,*11,*12) } (select)
11	Y9306LS	3	Screw
12	Y9308LS	2	Screw
13	B8724DC	1	Adaptor
14	B9900BR	1	Battery Assembly
15	B8724TD	1	Display Board Assembly
16	B8722EN	1	Bracket
17	B9988DL	1	Screw
18	B8722TD	1	AC Power Inlet Board (*1,*2,*3)
19	B8722TE	1	AC Power TERM Board (*4,*5,*6)
	B8724TH	1	DC Power TERM Assembly (*7,*8,*9,*10,*11,*12) } (select)
20	B8722ZA	1	Wire Assembly
21	B8722ZB	1	Wire Assembly (*1,*2,*3,*4,*5,*6)
22	Y9406LK	1	Screw
23	B9988DL	1	Screw
24	B8724ZC	1	SUMICARD

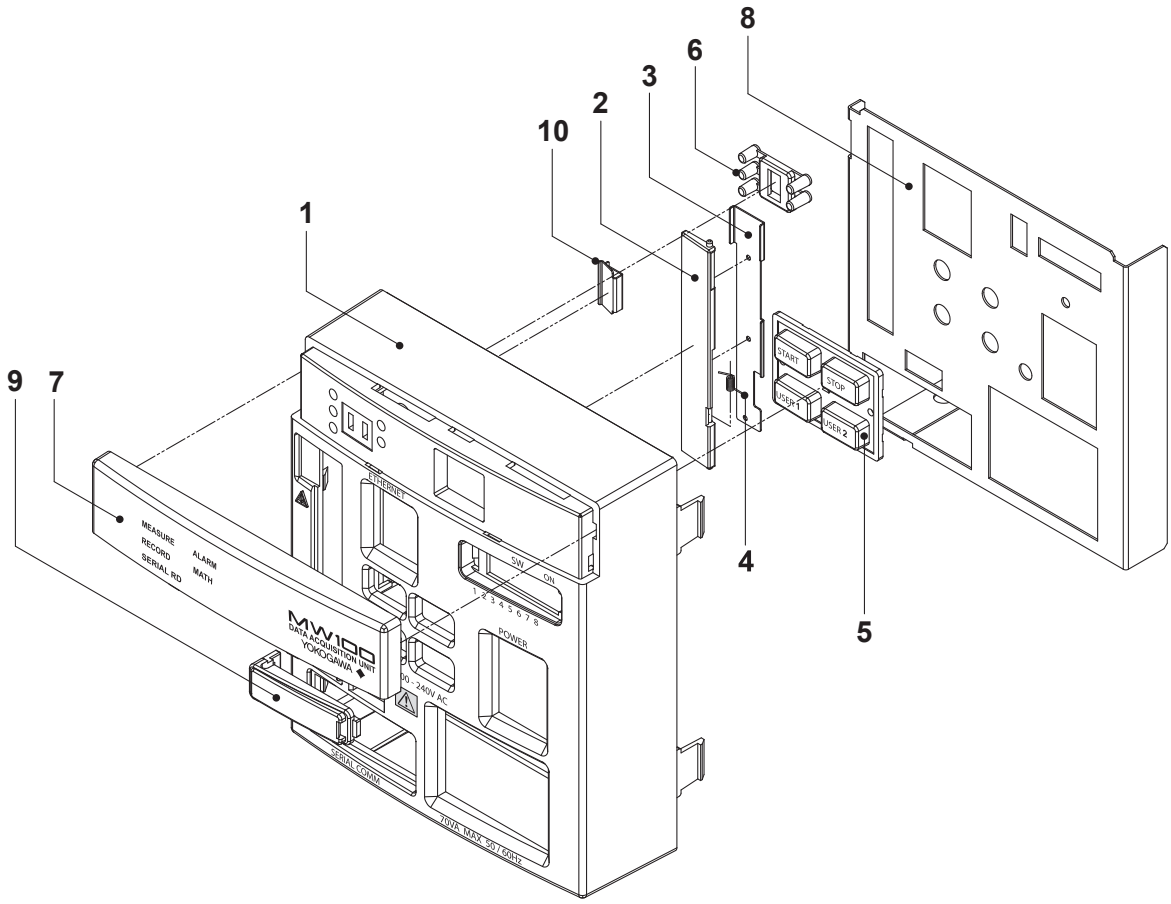
Item	Part No.	Qty	Description
25	B8724ZE	1	SUMICARD
◎ 26	E9655FX	3	Screw (*4,*5,*6,*7,*8,*9,*10,*11,*12)
27	B8724TG	1	External Board Assembly
28	Y9306LS	2	Screw
29	B8724TF	1	RS422A Board Assembly (*2,*5,*8,*11) } (select)
30	B8724TE	1	RS232C Board Assembly (*3,*6,*9,*12)
31	B9988DL	1	Screw (*2,*3,*5,*6,*8,*9,*11,*12)
32	Y9306LS	1	Screw (*2,*3,*5,*6,*8,*9,*11,*12)
33	B8724ZD	1	SUMICARD (*2,*3,*5,*6,*8,*9,*11,*12)
◎ 34	B8720HH	1	Stud
35	B8724EG	1	Bracket (*2,*3,*5,*6,*8,*9,*11,*12)

Note:

	MS CODE		
	Power	Cord	Option
*1	1	D,F,H,M,Q,R	–
*2	1	D,F,H,M,Q,R	C3
*3	1	D,F,H,M,Q,R	C2
*4	1	W	–
*5	1	W	C3
*6	1	W	C2
*7	2	D,F,H,M,Q,R	–
*8	2	D,F,H,M,Q,R	C3
*9	2	D,F,H,M,Q,R	C2
*10	3	W	–
*11	3	W	C3
*12	3	W	C2

◎ (CMP)

Bezel Assembly

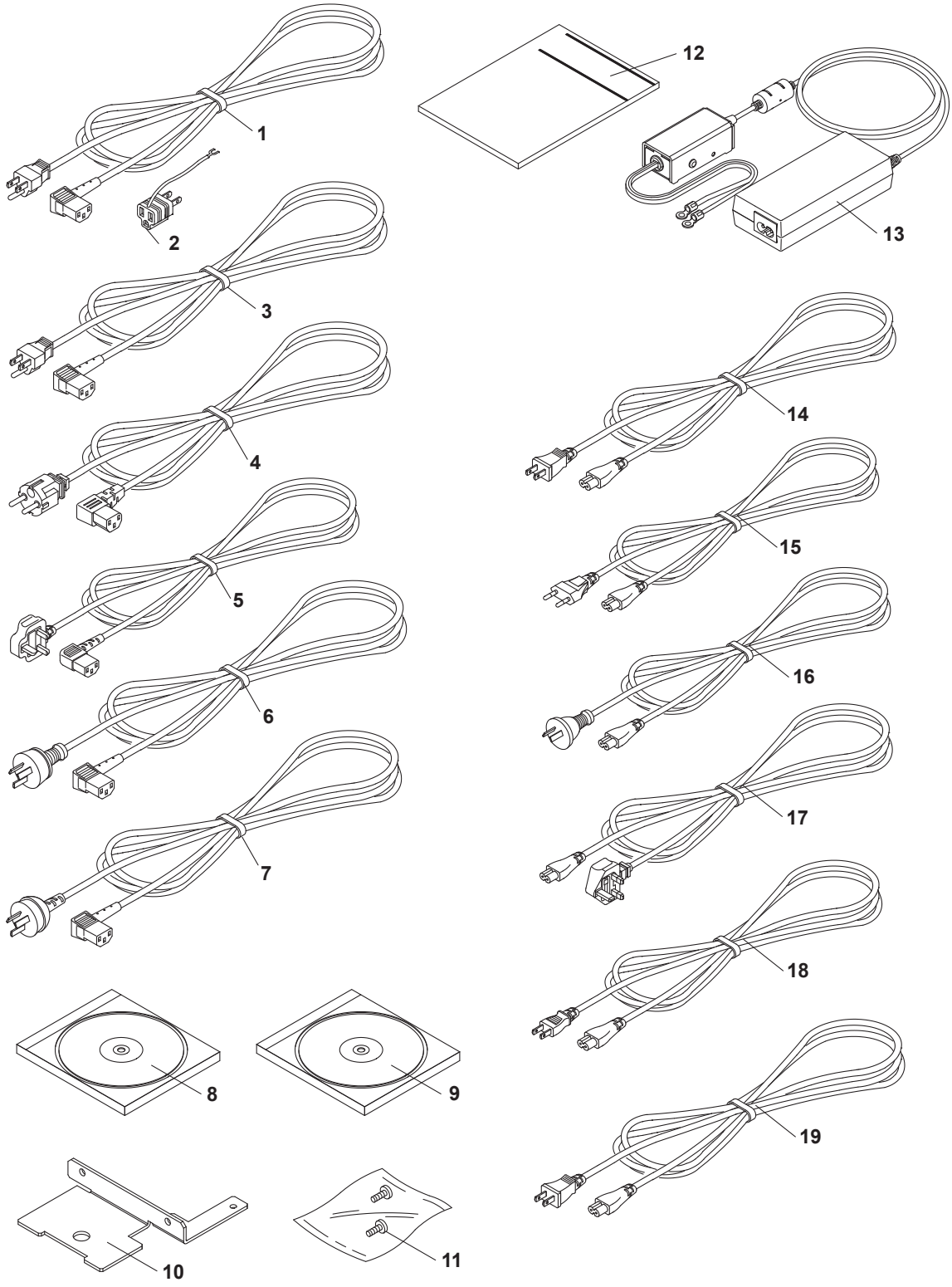


Item	Part No.	Qty	Description
1	B8724CT	1	Bezel (MW100-□-1) } (select)
	B8724CU	1	Bezel (MW100-□-2, 3) } (select)
2	B8724DE	1	Door
3	B8724EE	1	Bracket
4	B8722EL	1	Spring
5	B8724CW	1	Key Top
6	B8724DF	1	Lens
◎ 7	B8724CV	1	Filter
8	B8724ED	1	Bracket
◎ 9	B8722DQ	1	Cap
10	B8722EJ	1	Bracket

Note:

◎ (CMP)

6.4 MW100 Main Module Standard Accessories



	Item	Part No.	Qty	Description	
◎	1	A1073WD	1	Power Supply Cord	(-1M) (UL,CSA standard) *
◎	2	A1253JZ	1	3P-2P Adapter	
◎	3	A1074WD	1	Power Supply Cord (-1D) (UL,CSA standard)	(select)
◎	4	A1009WD	1	Power Supply Cord (-1F) (VDE standard)	
◎	5	A1054WD	1	Power Supply Cord (-1Q) (BS standard)	
◎	6	A1024WD	1	Power Supply Cord (-1R) (SAA standard)	
◎	7	A1064WD	1	Power Supply Cord (-1H) (GB standard)	
◎	8	B8724XA	1	CD-ROM for Manuals	
◎	9	B9991MZ	1	CD-ROM for MW Viewer	
◎	10	B8724EF	1	Bracket	
◎	11	B9988DL	2	Screw	
	12	-	-	Manuals	
◎	13	B8724YG	1	AC Adapter Assembly (-2)	
◎	14	B9988YA	1	Power Supply Cord (-2D) (UL,CSA standard)	(select)
◎	15	B9988YB	1	Power Supply Cord (-2F) (VDE standard)	
◎	16	B9988YC	1	Power Supply Cord (-2R) (SAA standard)	
◎	17	B9988YD	1	Power Supply Cord (-2Q) (BS standard)	
◎	18	B9988YE	1	Power Supply Cord (-2M) (UL,CSA standard)	
◎	19	B9988YJ	1	Power Supply Cord (-2H) (GB standard)	

Note: * For use in Japan only

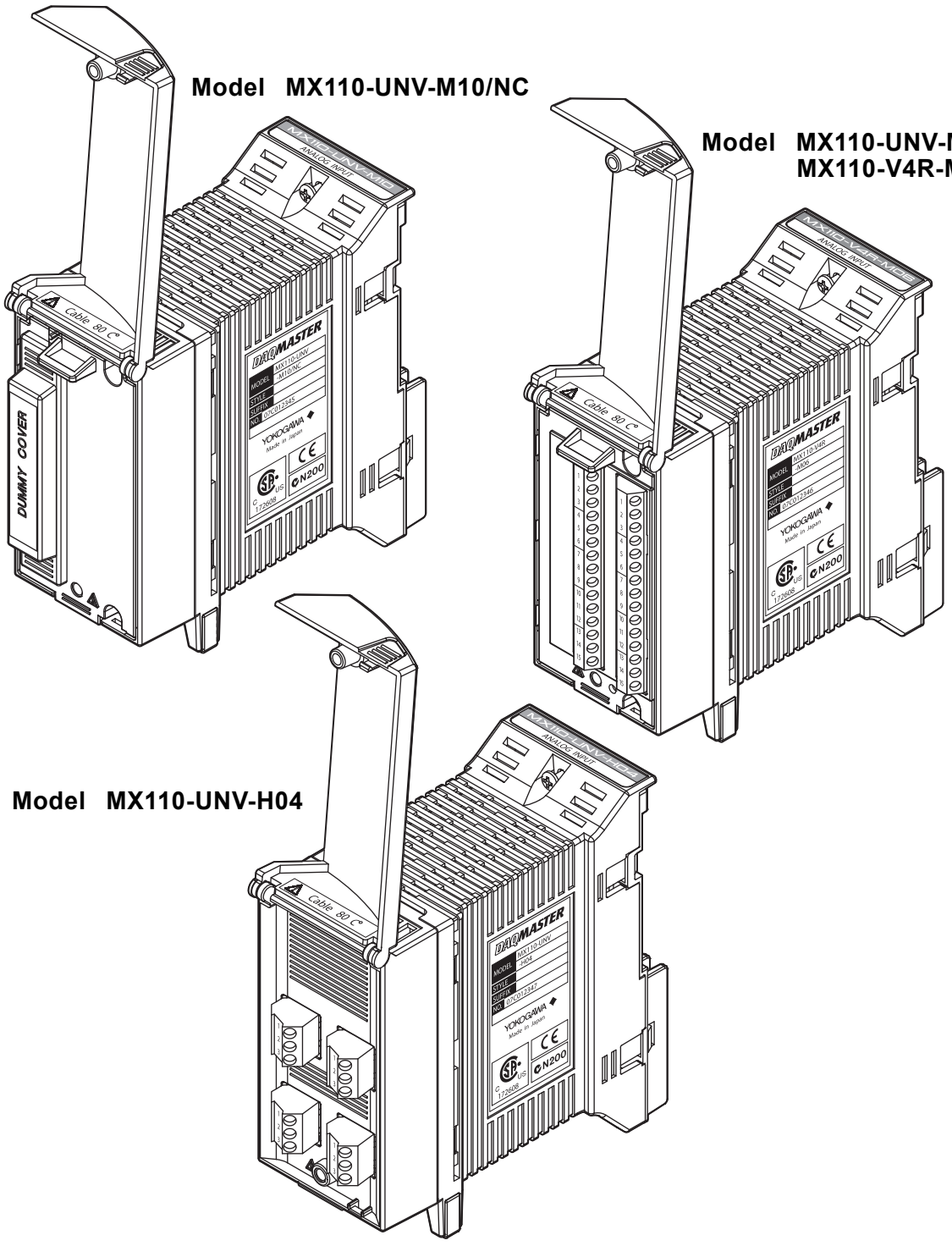
◎ (CMP)

6.5 MX110 Analog Input Module Customer Maintenance Parts List

Model MX110-UNV-M10/NC

Model MX110-UNV-M10
MX110-V4R-M06

Model MX110-UNV-H04



Note:

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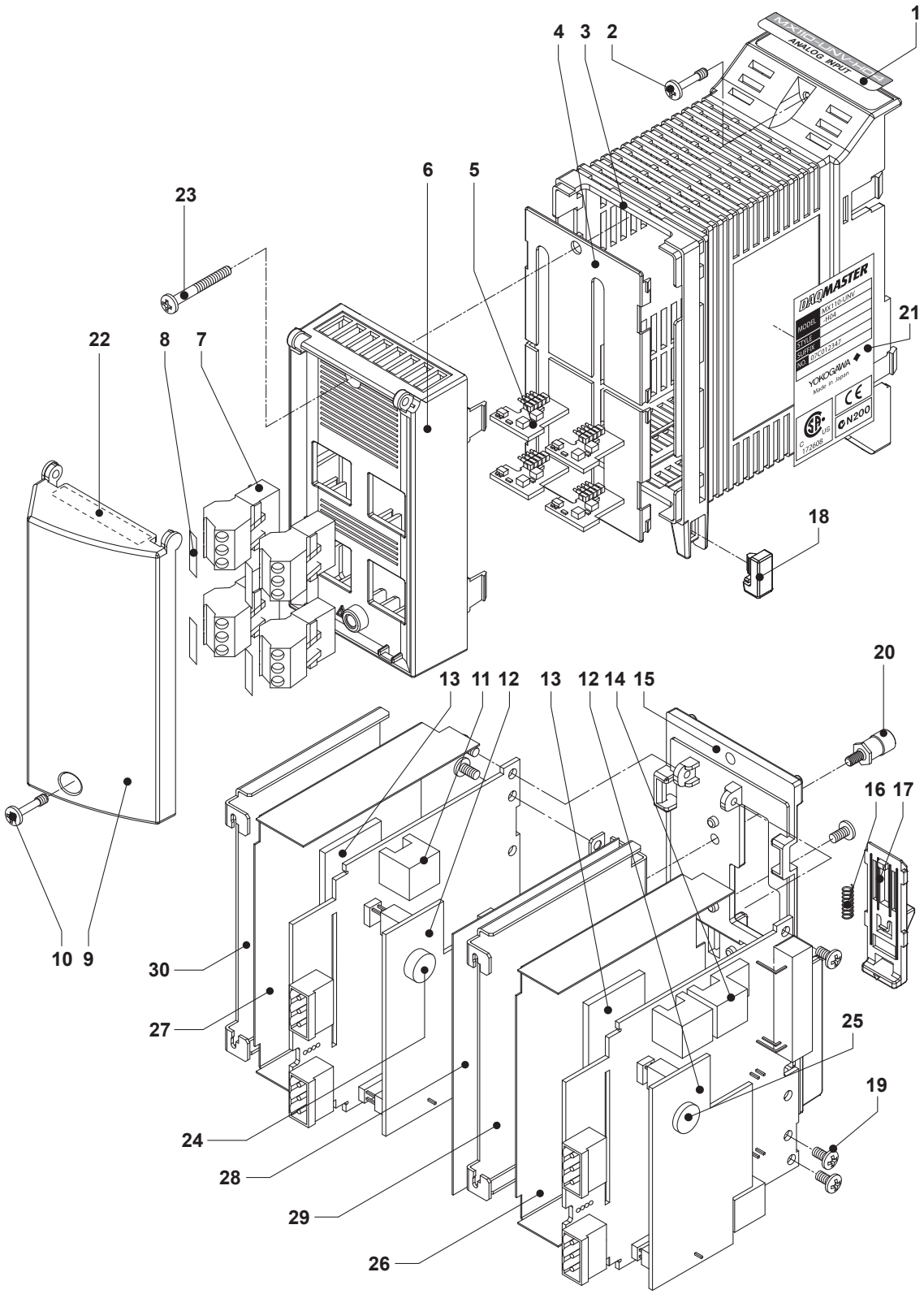
4-CH, High-Speed Universal Input Module (MX110-UNV-H04)

Analog input module MX110-UNV-H04



Analog input module MX110-UNV-H04

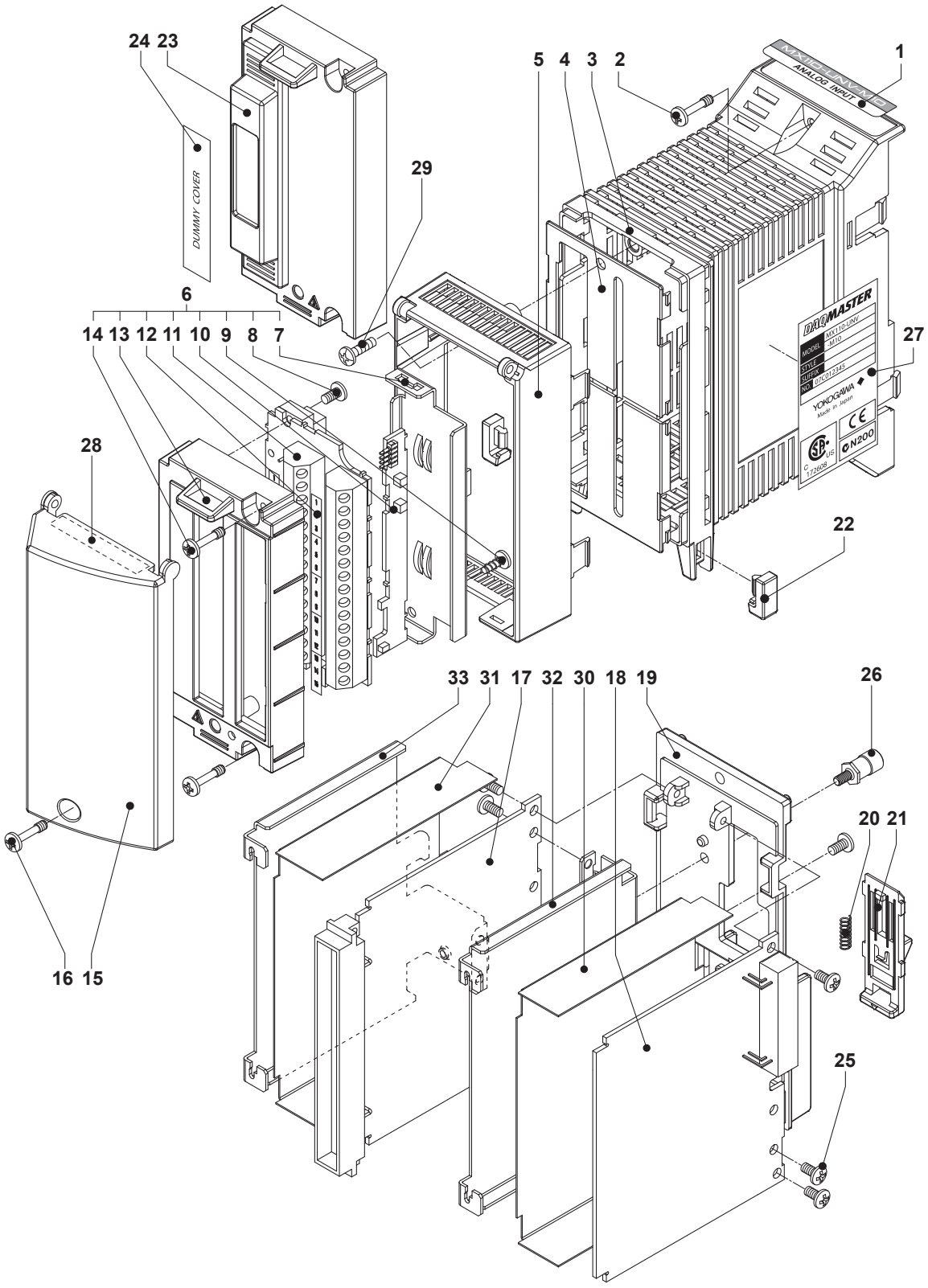
Item	Part No.	Qty	Description
◎ 1	B8720GA	1	Label
◎ 2	B8722EM	1	Screw
3	B8720CG	1	Case
4	B8720DC	1	Plate
5	B8720TH	4	H04 RJC Board
6	B8720CA	1	Bezel
◎ 7	A1840JT	4	Terminal
◎ 8	B8720AY	4	Label
◎ 9	B8720FA	1	TR Cover
◎ 10	B8722EM	1	Screw
11	B8720TB	1	H04 Input CTRL Board
12	B8720TC	2	H04 Input AD Board
13	B8720JH	2	Gel Sheet
14	B8720TA	1	H04 Input PWR Board
15	B8720DL	1	Module Back Plate
◎ 16	B8722EH	1	Spring
◎ 17	B8722DF	1	Latch
◎ 18	B8722DR	2	Foot
19	Y9306LS	7	Screw
◎ 20	B8720HH	1	Stud
21	–	1	Name Plate
◎ 22	B8720AK	1	Label
23	Y9325LS	1	Screw
24	B8720JK	1	Foot
25	B8720JL	1	Foot
26	B8720JA	1	Module Sheet
27	B8720JB	1	Module Sheet
28	B8720JC	1	Module Sheet
29	B8720HA	1	Bracket
30	B8720HB	1	Bracket

Note:

◎ (CMP)

10-CH, Medium-Speed Universal Input Module (MX110-UNV-M10 and MX110-UNV-M10/NC, MX110-V4R-M06)

Analog input module MX110-UNV-M10, MX110-UNV-M10/NC & MX110-V4R-M06



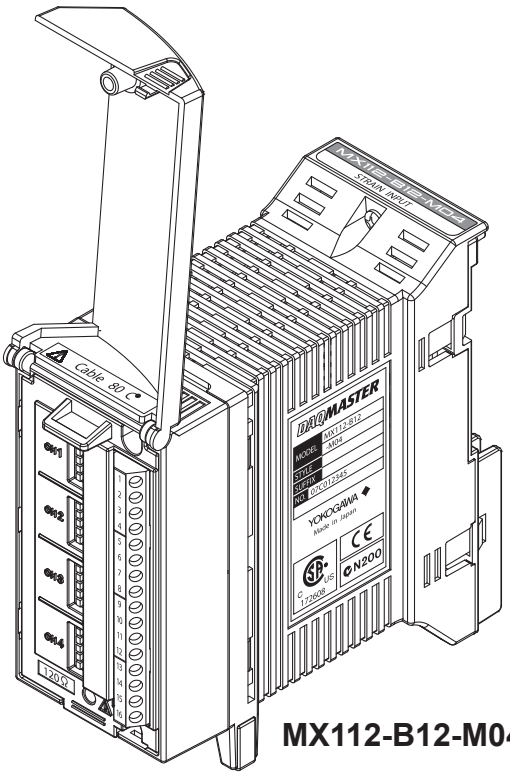
Analog input module MX110-UNV-M10, MX110-UNV-M10/NC & MX110-V4R-M06

Item	Part No.	Qty	Description
◎ 1	B8720GB	1	Label (-M10) } (select)
	B8720GH	1	Label (-M06) }
◎ 2	B8722EM	1	Screw
3	B8720CG	1	Module Case
4	B8720DG	1	Plate
5	B8720CB	1	Bezel
6	B8720BE	1	Front TR Assembly (not /NC) (-M10) } (select)
	B8720BT	1	Front TR Assembly (-M6) }
7	B8720HC	1	Bracket
8	Y9308JB	2	Screw
9	B9988DL	1	Screw
10	B8720TJ	1	M10 RJC Board (-M10)
11	B8720TF	1	M10 Terminal Board (-M10) } (select)
	B8720ME	1	4WRTD Terminal Board (-M06) }
◎ 12	B8720AZ	2	Label (-M10) } (select)
	B8720AW	2	Label (-M06) }
13	B8720CD	1	Panel
◎ 14	B8722EM	2	Screw
◎ 15	B8720FB	1	TR Cover (-M10) } (select)
	B8720FF	1	TR Cover (-M06) }
16	B8722EM	1	Screw
17	B8720TE	1	M10 Scanner board (-M10) } (select)
	B8720MD	1	4WRTD Scanner board (-M06) }
18	B8720TD	1	M10 Input CTRL board (-M10) } (select)
	B8720MC	1	4WRTD CTRL board (-M06) }
19	B8720DL	1	Module Back Plate
◎ 20	B8722EH	1	Spring
◎ 21	B8722DF	1	Latch
◎ 22	B8722DR	2	Foot
◎ 23	B8720CE	1	Panel (/NC)
◎ 24	B8720AC	1	Label (/NC)
25	Y9306LS	7	Screw
◎ 26	B8720HH	1	Stud
27	–	1	Name Plate
◎ 28	B8720AK	1	Label
29	Y9312LS	1	Screw
30	B8720JA	1	Module Sheet
31	B8720JB	1	Module Sheet
32	B8720HA	1	Bracket
33	B8720HB	1	Bracket

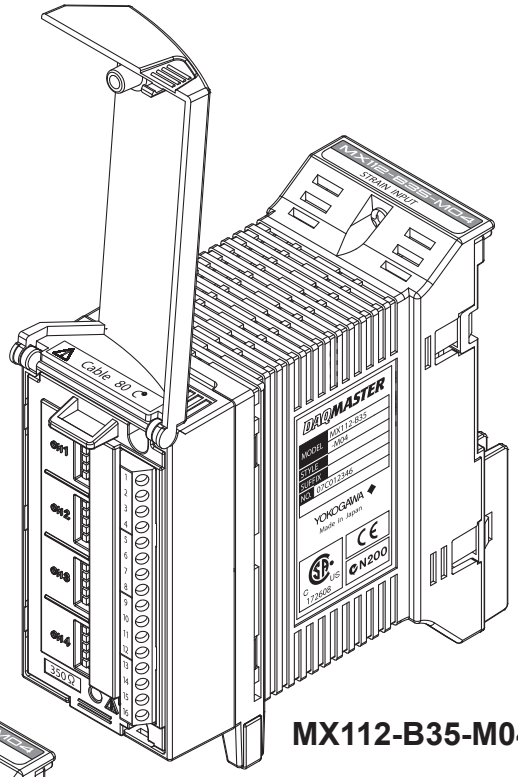
Note:

◎ (CMP)

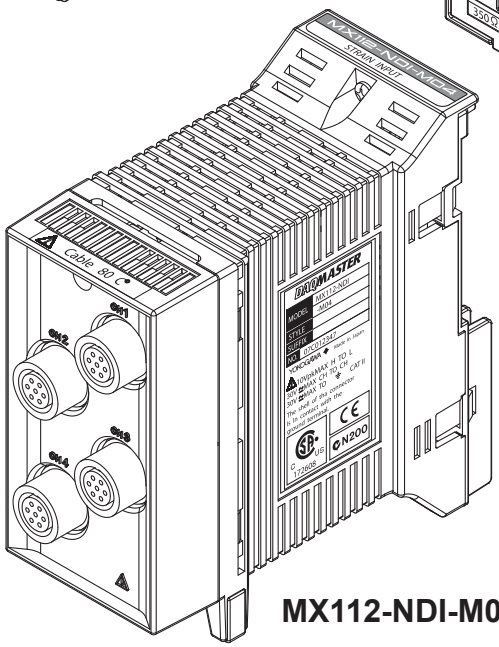
6.6 MX112 Strain Input Module Customer Maintenance Parts List



MX112-B12-M04



MX112-B35-M04



MX112-NDI-M04

Note:

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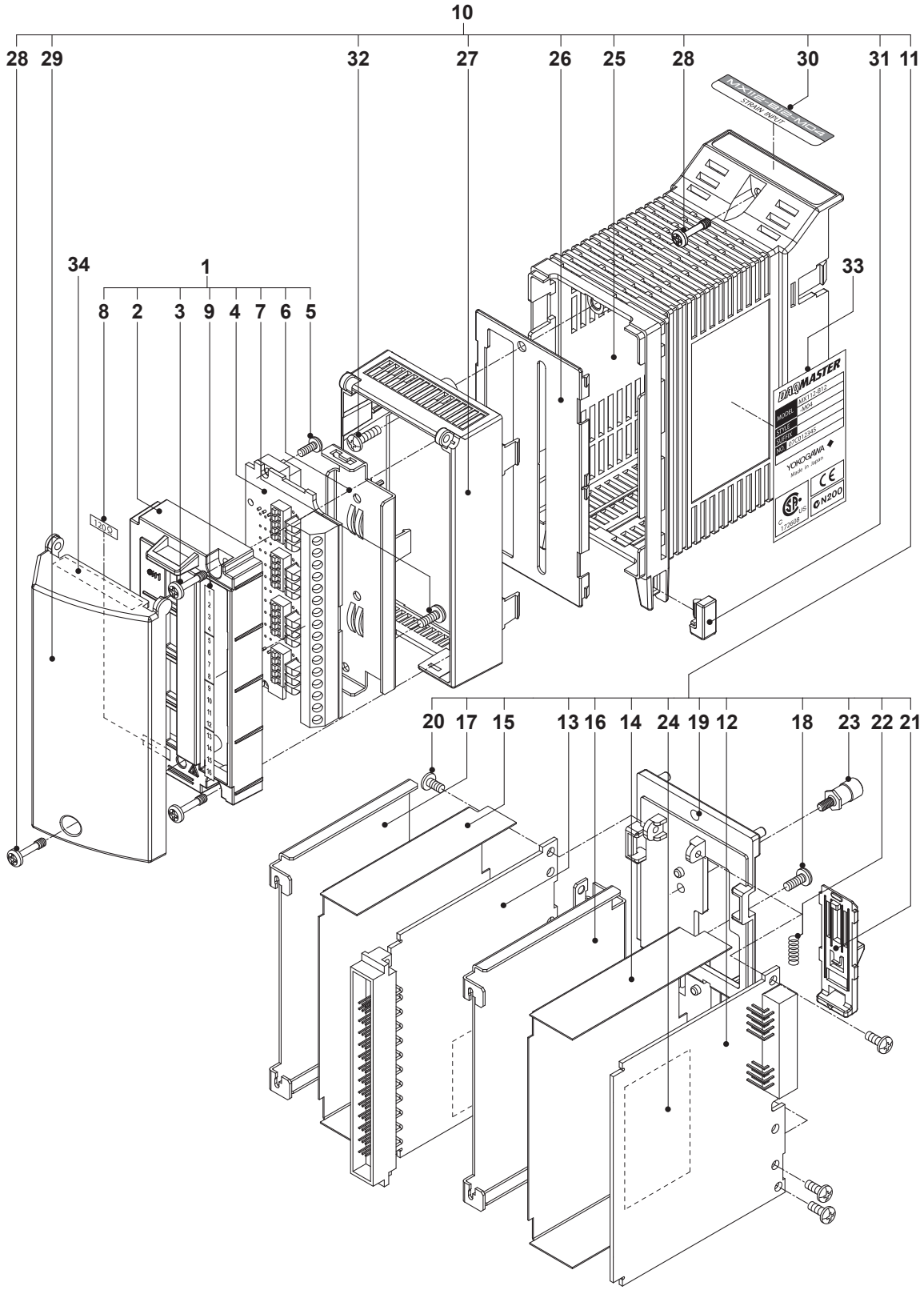
Complete Set (1-1)
MX112-B12-M04, MX112-B35-M04



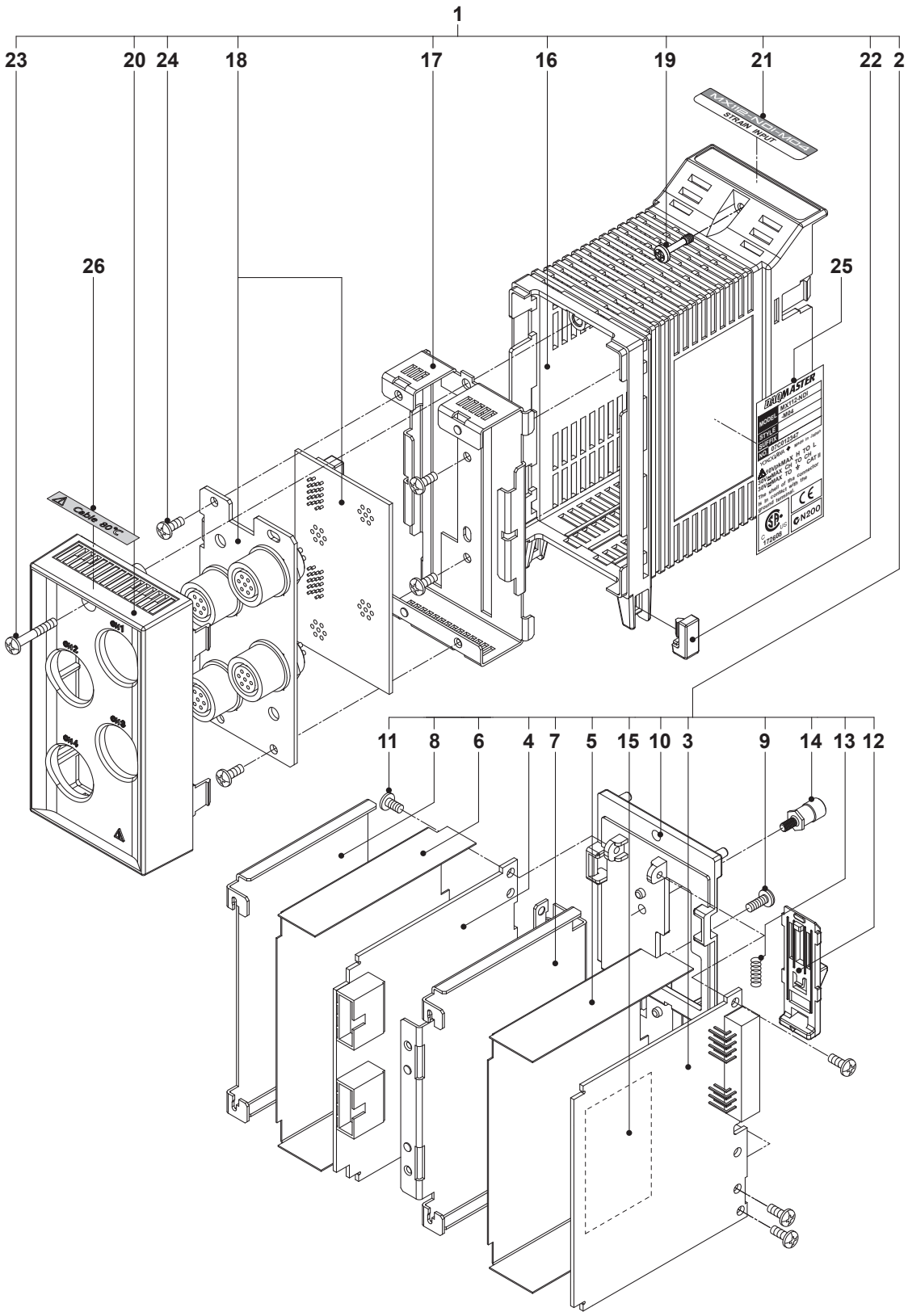
Complete Set (1-2)
MX112-B12-M04, MX112-B35-M04

	Item	Part No.	Qty	Description
	1	B8720BR	1	Front TR Assembly (-B12) } (select)
		B8720BS	1	Front TR Assembly (-B35) }
	2	B8720CH	1	Panel
	3	B8722EM	2	Screw
	4	B8720TU	1	STR CRP TM 120 board (-B12) } (select)
		B8720TT	1	STR CRP TM 350 board (-B35) }
	5	Y9308JB	2	Screw
	6	B8720HC	1	Bracket
	7	B9988DL	1	Screw
◎	8	B8720AF	1	Label (-B12) } (select)
◎		B8720AG	1	Label (-B35) }
◎	9	B8720AX	1	Label
	10	B8720BJ	1	Module Assembly (-B12) } (select)
		B8720BK	1	Module Assembly (-B35) }
	11	B8720EE	1	PCB Assembly
	12	B8720TR	1	Strain CTRL Board
	13	B8720TS	1	STR Clamp Scan Board
	14	B8720JA	1	Module Sheet
	15	B8720JB	1	Module Sheet
	16	B8720HA	1	Bracket
	17	B8720HB	1	Bracket
	18	Y9306LS	2	Screw
	19	B8720DL	1	Module Back Plate
	20	Y9306LS	5	Screw
◎	21	B8722DF	1	Latch
◎	22	B8722EH	1	Spring
◎	23	B8720HH	1	Stud
	24	B8720JH	2	Gel Sheet
	25	B8720CG	1	Case
	26	B8720DG	1	Plate
	27	B8720CB	1	Bezel
◎	28	B8722EM	2	Screw
◎	29	B8720FE	1	TR Cover
	30	B8720GE	1	Label (-B12) } (select)
		B8720GF	1	Label (-B35) }
◎	31	B8722DR	2	Foot
	32	Y9312LS	1	Screw
	33	–	1	Name Plate
◎	34	B8720AK	1	Label

Note:

◎ (CMP)

Complete Set (2-1)
MX112-NDI-M04



Complete Set (2-2)
MX112-NDI-M04

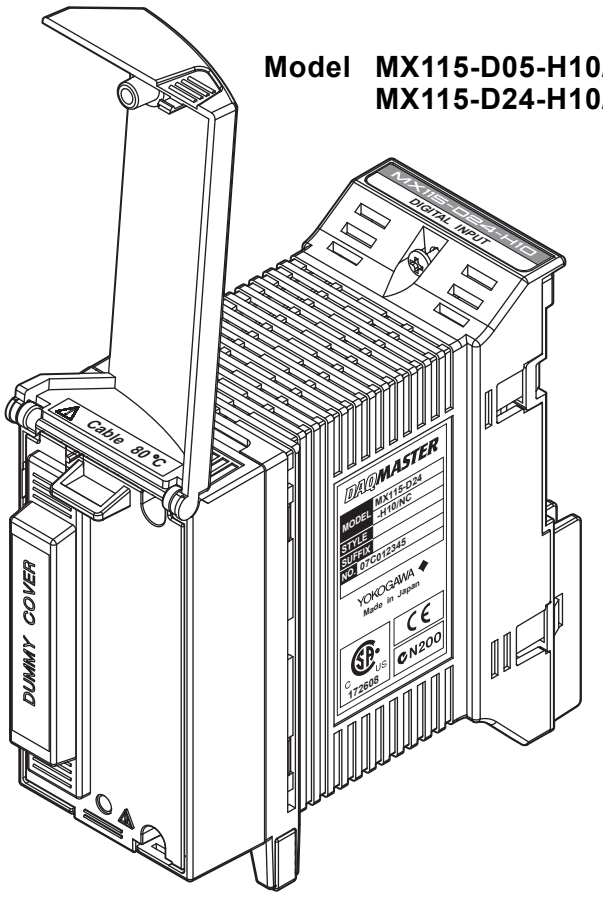
	Item	Part No.	Qty	Description
	1	B8720BL	1	Module Assembly
	2	B8720EF	1	PCB Assembly
	3	B8720TR	1	Strain CTRL Board
	4	B8720TV	1	STR NDIS Scan Board
	5	B8720JA	1	Module Sheet
	6	B8720JB	1	Module Sheet
	7	B8720HG	1	Bracket
	8	B8720HB	1	Bracket
	9	Y9306LS	2	Screw
	10	B8720DL	1	Module Back Plate
	11	Y9306LS	5	Screw
◎	12	B8722DF	1	Latch
◎	13	B8722EH	1	Spring
◎	14	B8720HH	1	Stud
	15	B8720JH	2	Gel Sheet
	16	B8720CG	1	Case
	17	B8720HF	1	Bracket
	18	B8720BU	1	Terminal Assembly
◎	19	B8722EM	1	Screw
	20	B8720DS	1	Bezel
	21	B8720GC	1	Label
◎	22	B8722DR	2	Foot
	23	Y9325LS	1	Screw
	24	Y9306LS	4	Screw
	25	–	1	Name Plate
◎	26	B8720AK	1	Label

Note:

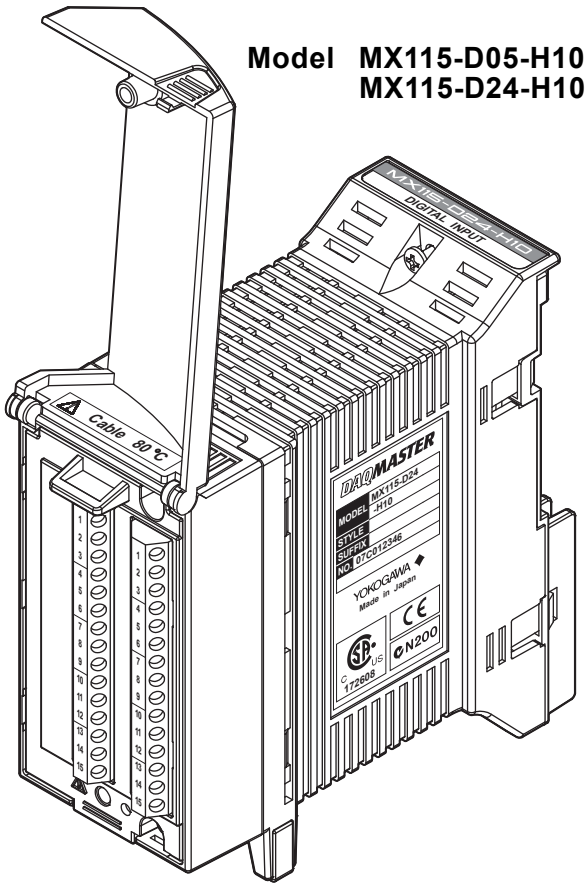
◎ (CMP)

6.7 MX115 Digital Input Module Customer Maintenance Parts List

Model MX115-D05-H10/NC
MX115-D24-H10/NC



Model MX115-D05-H10
MX115-D24-H10



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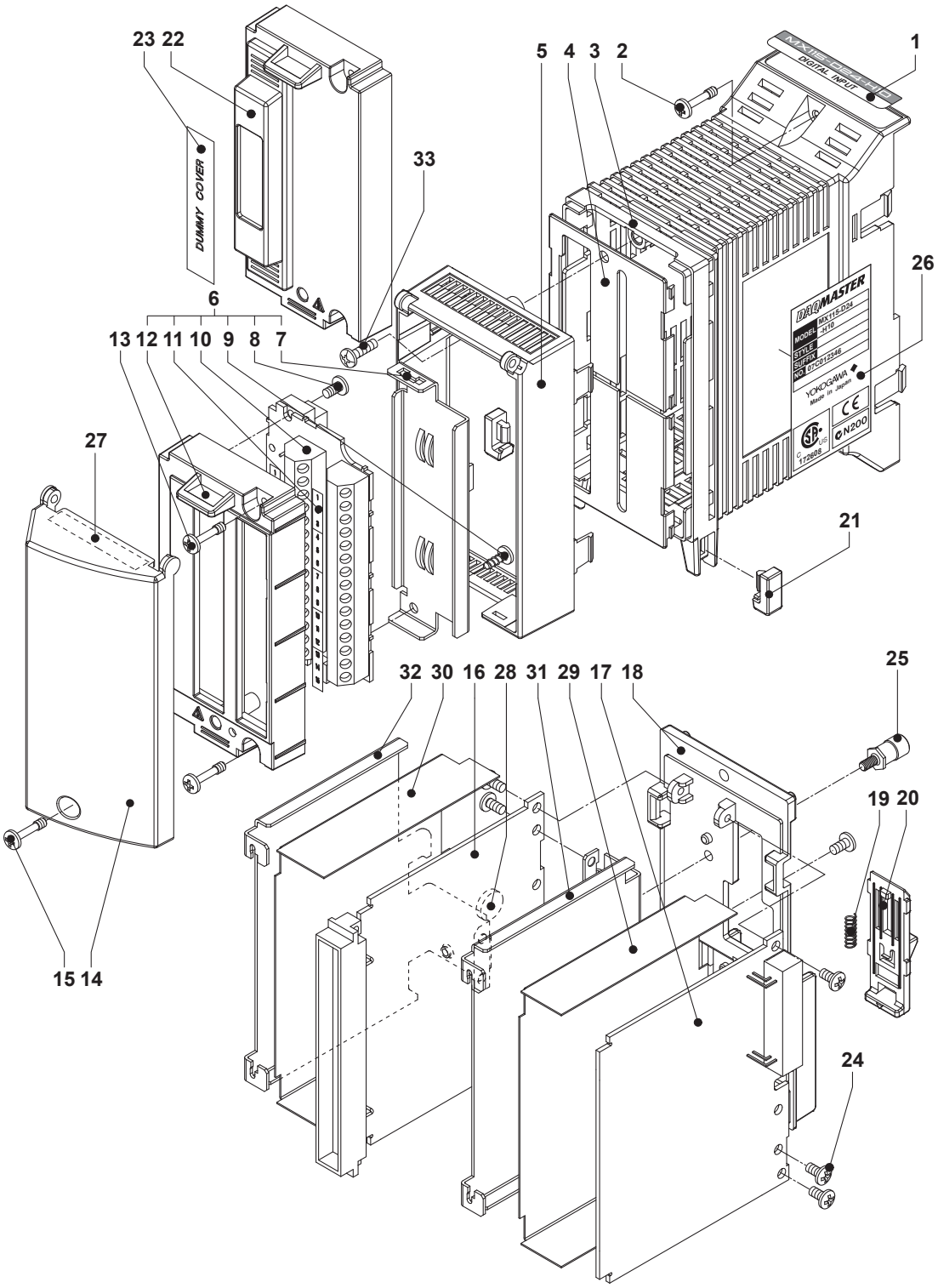
MX115-D05-H10 and MX115-D05-H10/NC

Digital input Module MX115-D05-H10, MX115-D05-H10/NC
MX115-D24-H10, MX115-D24-H10/NC



Digital input Module MX115-D05-H10, MX115-D05-H10/NC MX115-D24-H10, MX115-D24-H10/NC

Item	Part No.	Qty	Description
◎ 1	B8720GD	1	Label (-D05) } (select)
	B8720GJ	1	Label (-D24) }
◎ 2	B8722EM	1	Screw
3	B8720CG	1	Case
4	B8720DG	1	Plate
5	B8720CB	1	Bezel
6	B8720BF	1	Front TR Assembly (not /NC)
7	B8720HC	1	Bracket
8	Y9308JB	2	Screw
9	B9988DL	1	Screw
10	B8720MJ	1	DCVDI Terminal Board
11	B8720AZ	2	Label
12	B8720CD	1	Panel
◎ 13	B8722EM	2	Screw
◎ 14	B8720FD	1	TR Cover (-D05) } (select)
	B8720FG	1	TR Cover (-D24) }
◎ 15	B8722EM	1	Screw
16	B8720TM	1	DI Input board (-D05) } (select)
	B8720TQ	1	24VDI Input board (-D24) }
17	B8720TL	1	DI Power board
18	B8720DL	1	Module Back Plate
◎ 19	B8722EH	1	Spring
◎ 20	B8722DF	1	Latch
◎ 21	B8722DR	2	Foot
◎ 22	B8720CE	1	Panel (/NC)
◎ 23	B8720AC	1	Label (/NC)
24	Y9306LS	7	Screw
◎ 25	B8720HH	1	Stud
26	–	1	Name Plate
◎ 27	B8720AK	1	Label
28	B8720JL	1	Foot
29	B8720JA	1	Module Sheet
30	B8720JB	1	Module Sheet
31	B8720HA	1	Bracket
32	B8720HB	1	Bracket
33	Y9312LS	1	Screw

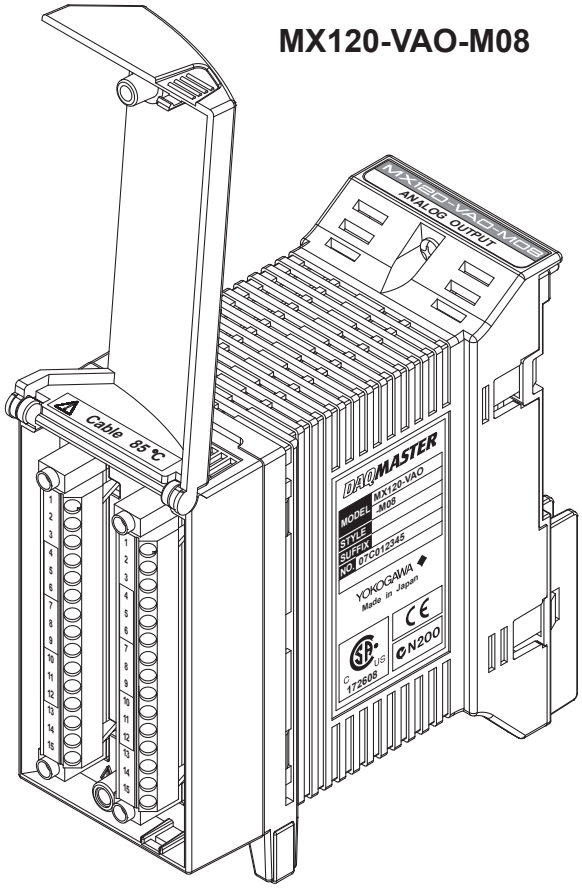
Note:

◎ (CMP)

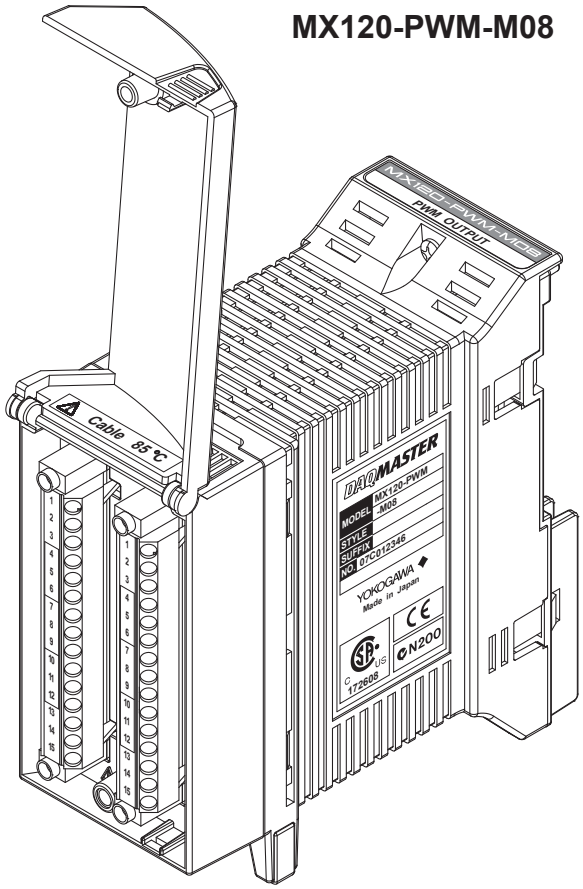
6.8 MX120 Output Module Customer Maintenance Parts List

(MX120-VAO-M08, MX120-PWM-M08)

MX120-VAO-M08



MX120-PWM-M08



Note:

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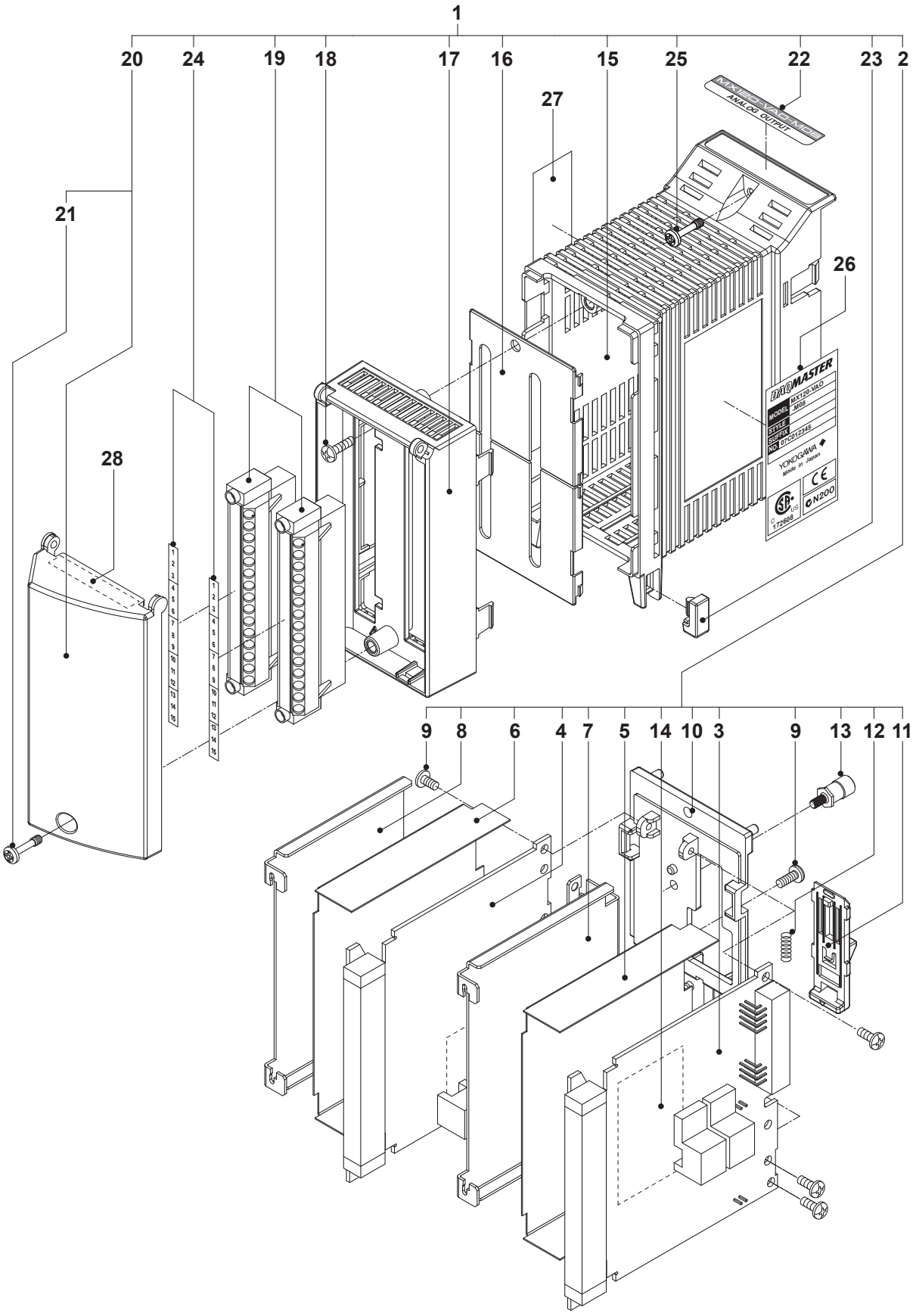
Complete Set (1)
MX120-VAO-M08, MX120-PWM-M08



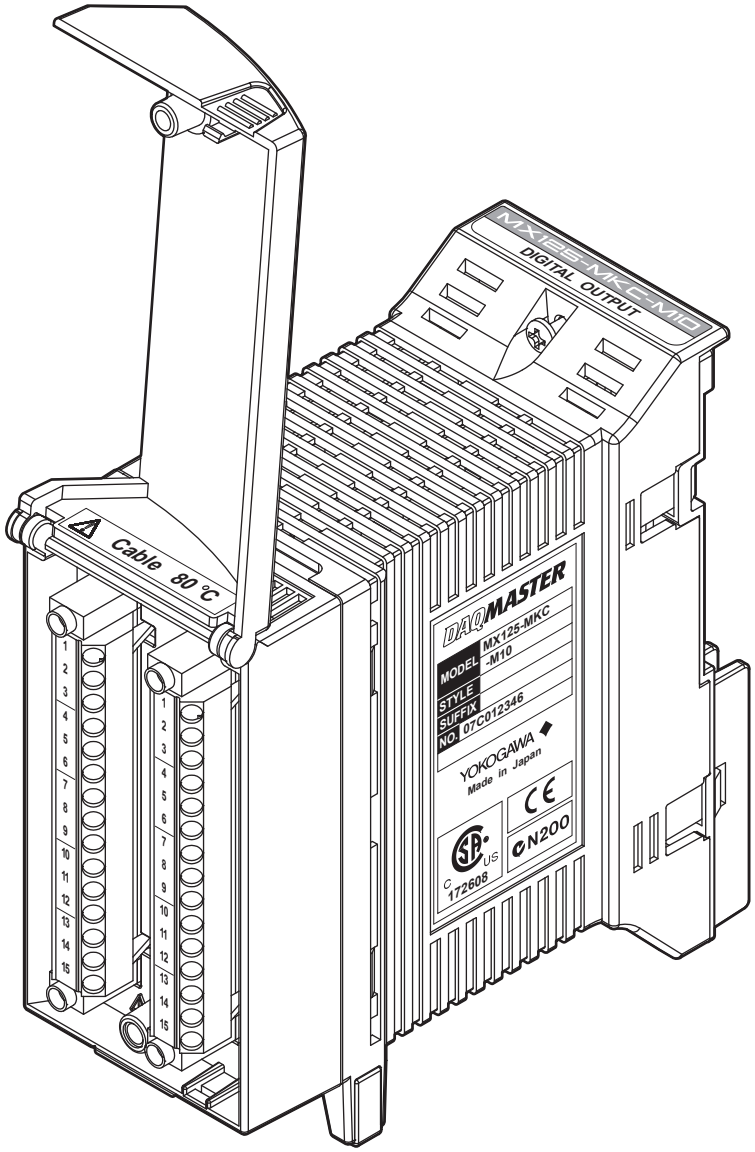
Complete Set (2)
MX120-VAO-M08, MX120-PWM-M08

	Item	Part No.	Qty	Description
	1	B8720BP	1	Module Assembly (-VAO) } (select)
		B8720BQ	1	Module Assembly (-PWM) }
	2	B8720EJ	1	PCB Assembly (-VAO) } (select)
		B8720EK	1	PCB Assembly (-PWM) }
	3	B8720TX	1	AO Power Board (-VAO) } (select)
		B8720MA	1	PWM CTRL Board (-PWM) }
	4	B8720TY	1	AO CTRL Board (-VAO) } (select)
		B8720MB	1	PWM Power Board (-PWM) }
	5	B8720JA	1	Module Sheet
	6	B8720JB	1	Module Sheet
	7	B8720HA	1	Bracket
	8	B8720HB	1	Bracket
	9	Y9306LS	7	Screw
	10	B8720DL	1	Module Back Plate
◎	11	B8722DF	1	Latch
◎	12	B8722EH	1	Spring
◎	13	B8720HH	1	Stud
	14	B8720JH	3	Gel Sheet (-VAO) } (select)
		B8720JH	4	Gel Sheet (-PWM) }
	15	B8720CG	1	Case
	16	B8720DC	1	Plate
	17	B8720CC	1	Bezel
	18	Y9320LS	1	Screw
	19	A1721JD	2	RECT Cable Connecter
◎	20	B8720FJ	1	TR Cover (-VAO) } (select)
		B8720FH	1	TR Cover (-PWM) }
◎	21	B8722EM	1	Screw
	22	B8720GK	1	Label (-VAO) } (select)
		B8720GL	1	Label (-PWM) }
◎	23	B8722DR	2	Foot
◎	24	B8720AZ	1	Label
◎	25	B8722EM	1	Screw
	26	–	1	Name Plate
◎	27	B8720AH	1	Label
◎	28	B8720AJ	1	Label

Note:

◎ (CMP)

6.9 MX125 Digital Output Module Customer Maintenance Parts List



Note:

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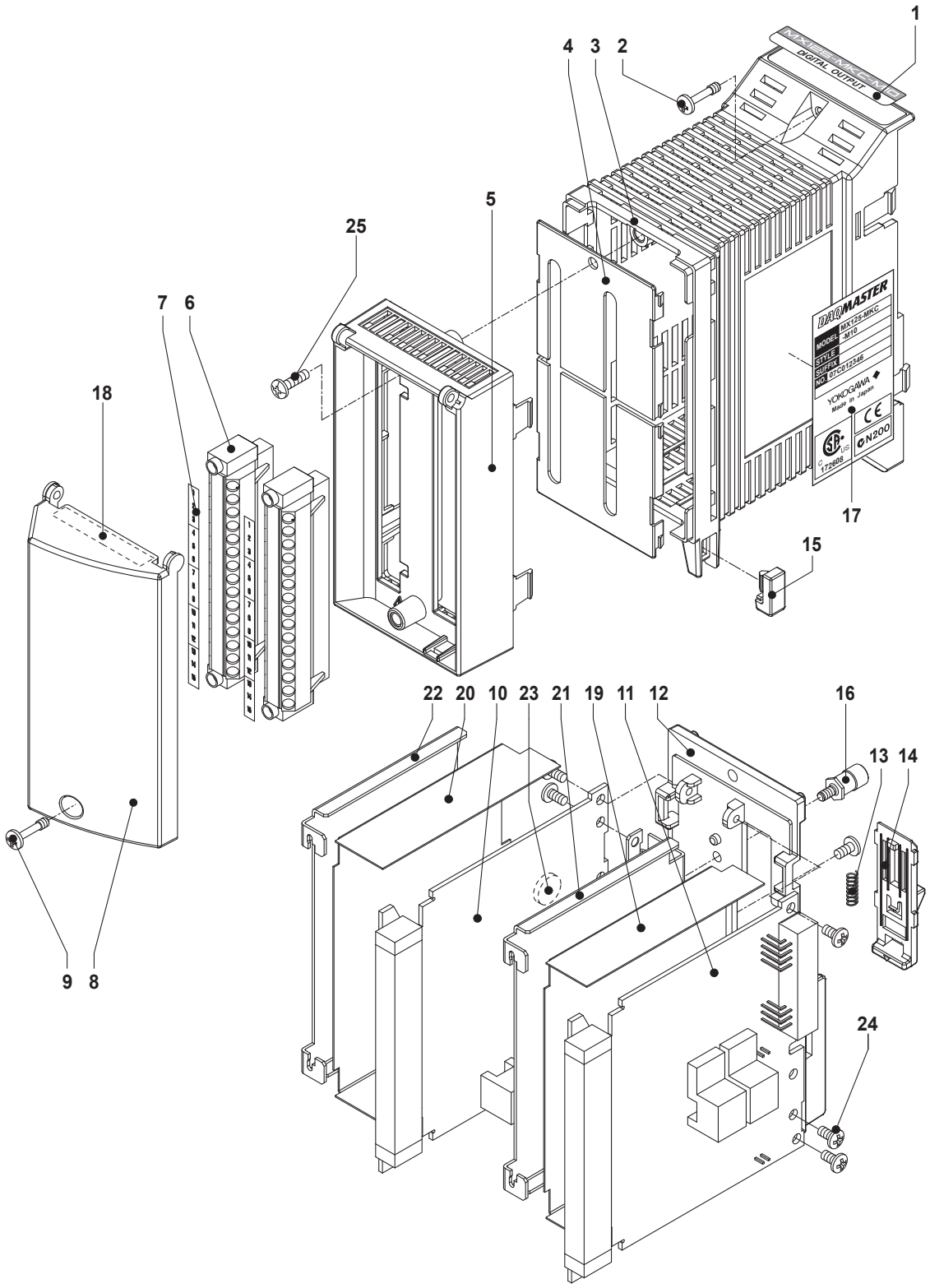
CMPL MX125-01E

Digital output module MX125-MKC-M10



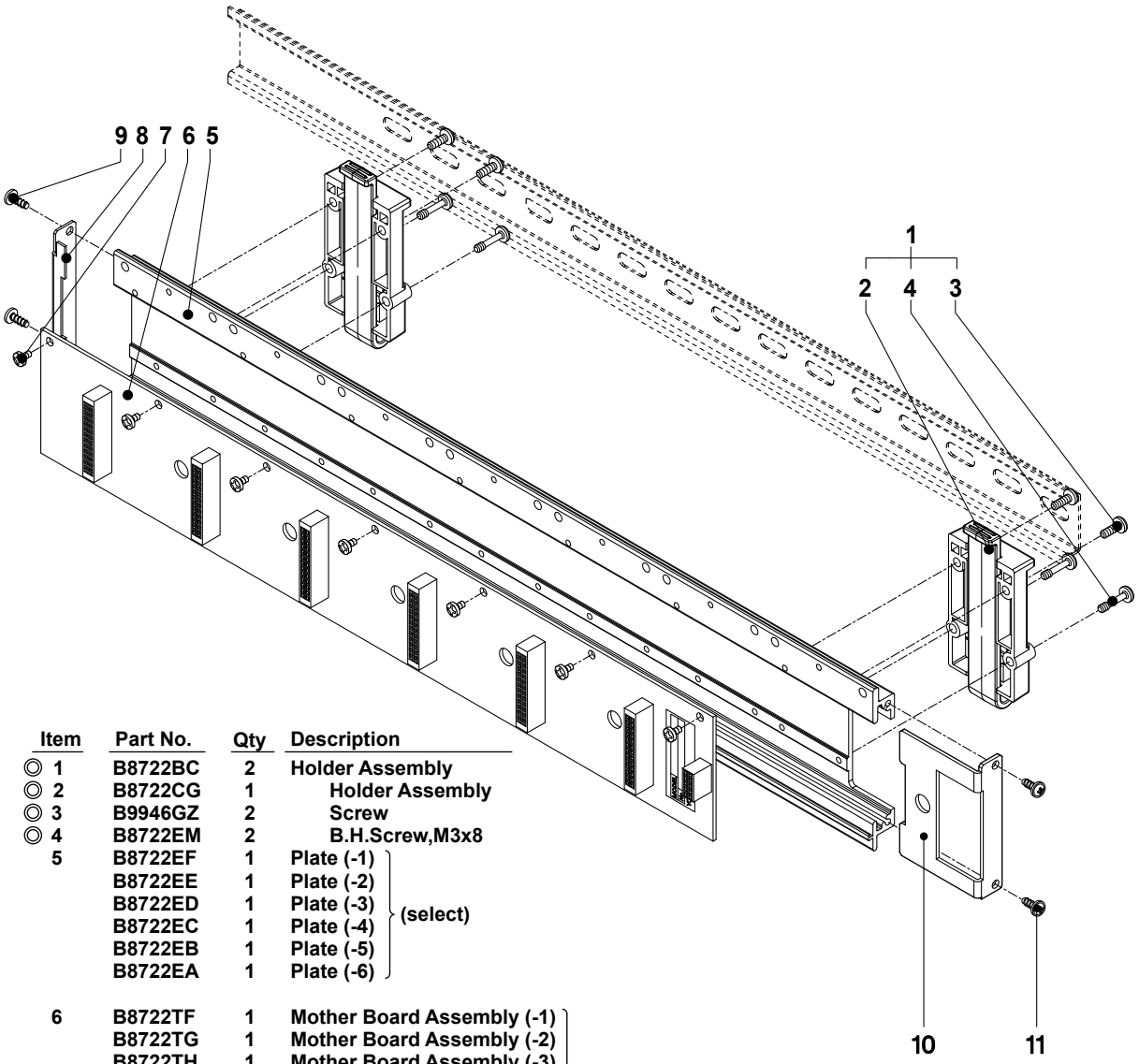
Digital Ouyput Module MX125-MKC-M10

Item	Part No.	Qty	Description
◎ 1	B8720GC	1	Label
◎ 2	B8722EM	1	Screw
3	B8720CG	1	Case
4	B8720DC	1	Plate
5	B8720CC	1	Bezel
◎ 6	A1721JD	2	RECT Cable Conn
◎ 7	B8720AZ	2	Label
◎ 8	B8720FC	1	TR Cover
◎ 9	B8722EM	1	Screw
10	B8720TP	1	DO Relay board
11	B8720TN	1	DO Power board
12	B8720DL	1	Module Back Plate
◎ 13	B8722EH	1	Spring
◎ 14	B8722DF	1	Latch
◎ 15	B8722DR	2	Foot
◎ 16	B8720HH	1	Stud
17	–	1	Name Plate
◎ 18	B8720AK	1	Label
19	B8720JA	1	Module Sheet
20	B8720JB	1	Module Sheet
21	B8720HA	1	Bracket
22	B8720HB	1	Bracket
23	B8720JL	1	Foot
24	Y9306LS	7	Screw
25	Y9320LS	1	Screw

Note:

◎ (CMP)

6.10 MX150 Base Plate Customer Maintenance Parts List



Item	Part No.	Qty	Description
◎ 1	B8722BC	2	Holder Assembly
◎ 2	B8722CG	1	Holder Assembly
◎ 3	B9946GZ	2	Screw
◎ 4	B8722EM	2	B.H.Screw,M3x8
5	B8722EF	1	Plate (-1) }
	B8722EE	1	Plate (-2)
	B8722ED	1	Plate (-3) } (select)
	B8722EC	1	Plate (-4)
	B8722EB	1	Plate (-5)
	B8722EA	1	Plate (-6) }
6	B8722TF	1	Mother Board Assembly (-1) }
	B8722TG	1	Mother Board Assembly (-2)
	B8722TH	1	Mother Board Assembly (-3) } (select)
	B8722TJ	1	Mother Board Assembly (-4)
	B8722TK	1	Mother Board Assembly (-5)
	B8722TL	1	Mother Board Assembly (-6) }
7	Y9306LS	2	B,H,Screw.M3x6 (-1) }
	Y9306LS	3	B,H,Screw.M3x6 (-2)
	Y9306LS	4	B,H,Screw.M3x6 (-3) } (select)
	Y9306LS	5	B,H,Screw.M3x6 (-4)
	Y9306LS	6	B,H,Screw.M3x6 (-5)
	Y9306LS	7	B,H,Screw.M3x6 (-6) }
8	B8722EU	1	Bracket
9	B9988DL	2	Screw
◎ 10	B8722EW	1	Bracket
◎ 11	B9988DL	2	Screw

Note:

- **Parts marked with a ◎symbol are Customer Maintenance Parts (CMP).**
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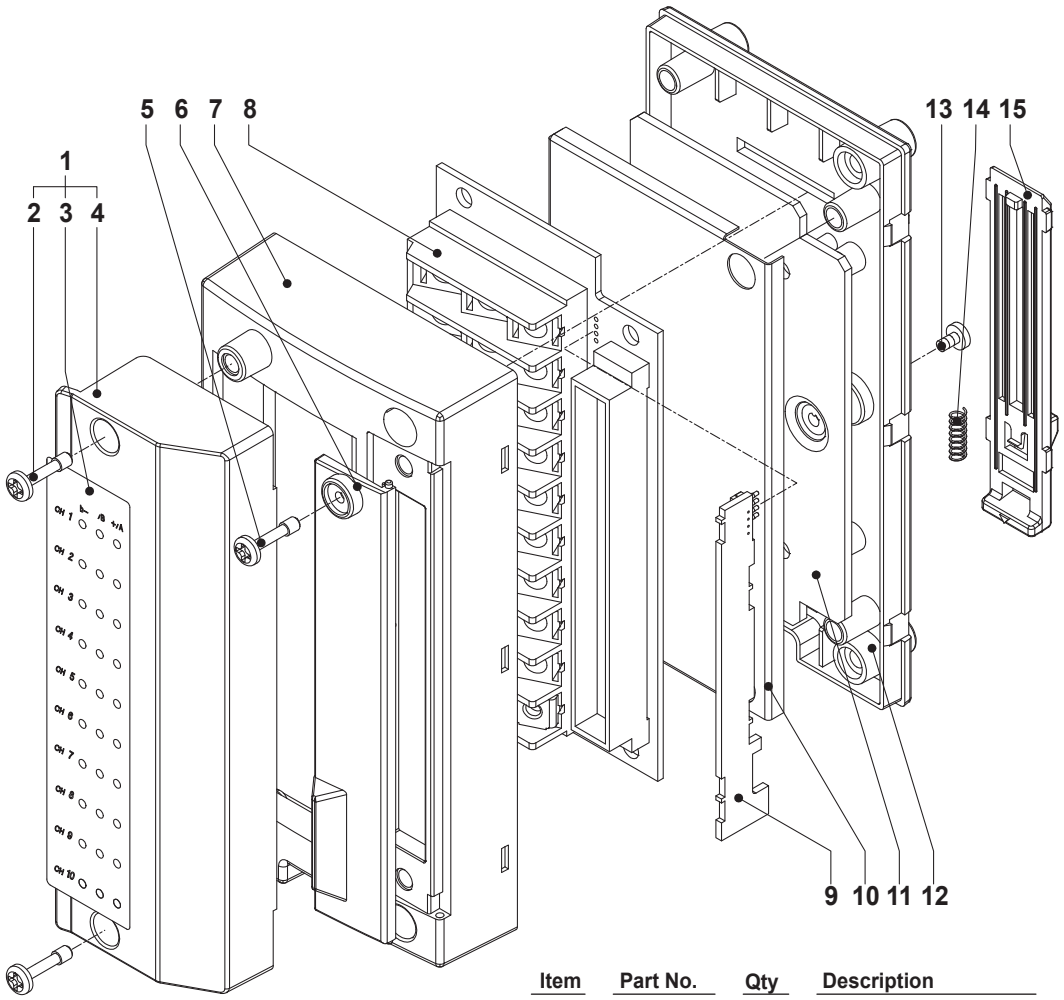
6.11 10-CH Screw Terminal Block (772061) Customer Maintenance Parts List



Item	Part No.	Qty	Description
◎ 1	B9237AF	1	Terminal Cover Assembly
◎ 2	B9900SG	2	Screw
◎ 3	B9237AS	1	Name Plate
◎ 4	B9237AG	1	Terminal Cover
◎ 5	B9900SG	1	Screw
◎ 6	B8720DP	1	Terminal Door
7	B8720CF	1	Terminal Cover
8	B8720TG	1	M10 Screw Terminal Board
9	B8720TJ	1	M10 RJC Board
10	B8720JD	1	Sheet
11	B8720HD	1	Bracket
12	B8720DN	1	Terminal Base
13	Y9306LS	1	B,H,Screw.M3x6
◎ 14	B8722EH	1	Spring
◎ 15	B8720DQ	1	Latch

Note:

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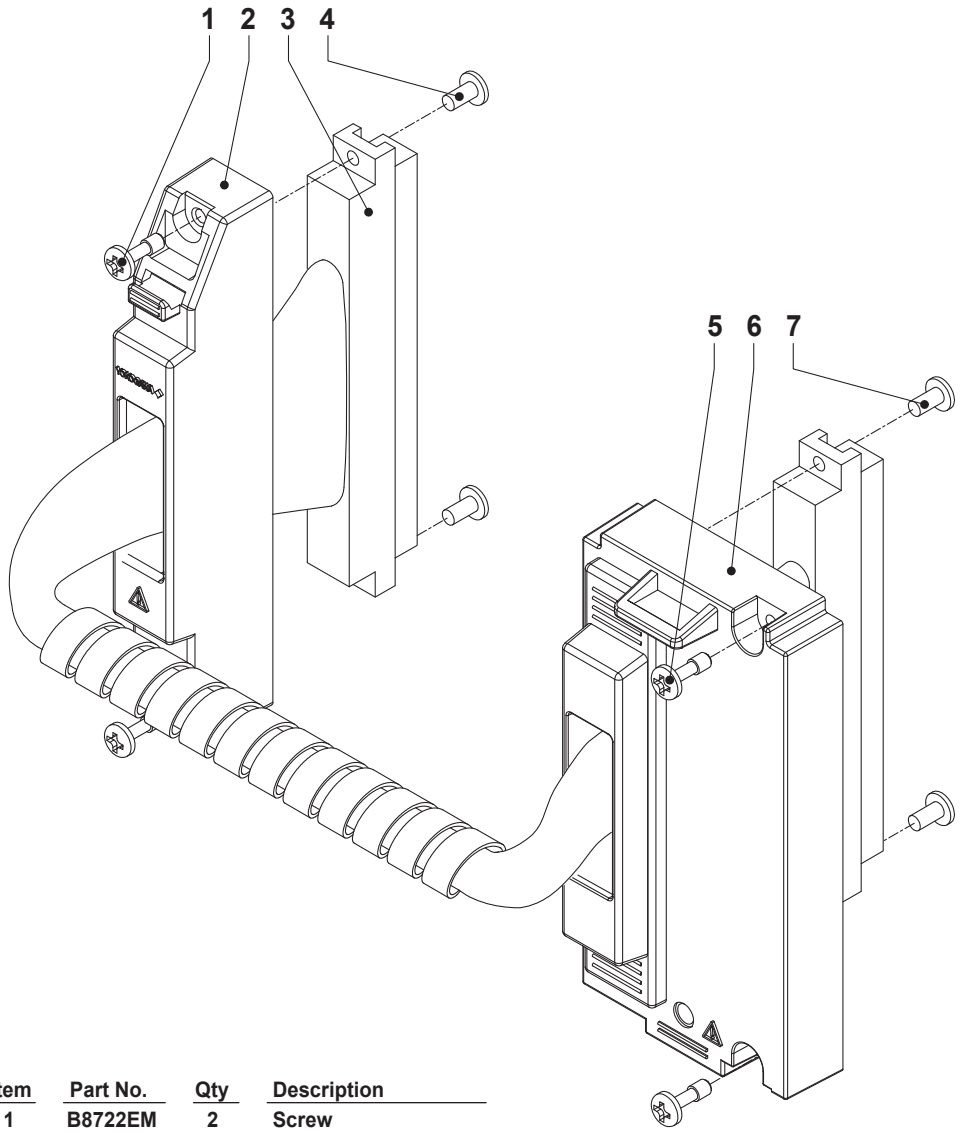
CMPL 772061-01E

6.12 Plate with Clamp Terminals (772063) Customer Maintenance Parts List



Item	Part No.	Qty	Description	
◎ 1	B8722EM	2	Screw	
2	B8720DK	1	Conn Cover	
3	B8720ZA	1	Cable Assembly (0.5m)(-050)	} (select)
	B8720ZB	1	Cable Assembly (1.0m)(-100)	
4	B1010BS	2	Tapping Screw	
◎ 5	B8722EM	2	Screw	
6	B8720CE	1	Panel	
7	B1010BS	2	Tapping Screw	

Note:

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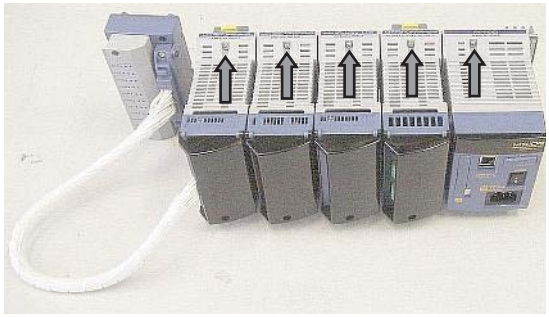
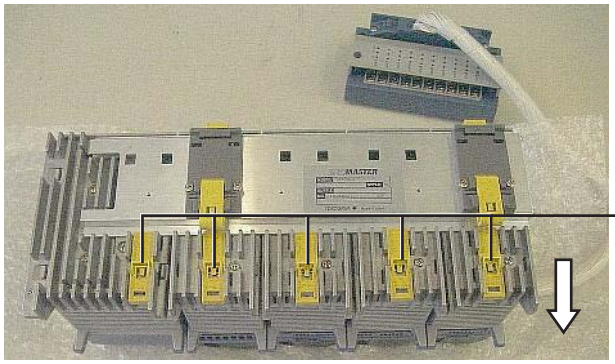
7.1 Disassembling the MX150 Base Plate

1. Loosen the screws indicated by the arrow in the figure below. The screws cannot fall out. Loosen the screws completely.



2. Pull the module out while pulling the yellow latch on the rear panel of the MX150 in the direction of the arrow, then remove the module.



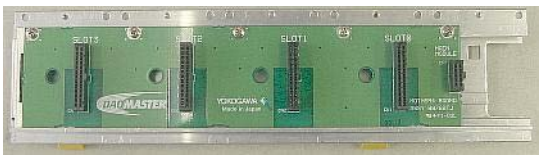
Note

The MX100's rear panel is facing upward in the figure below, but when you actually perform this procedure it is easier to remove the module when oriented as shown in the above figure.
When removing all modules, it is easier to do so if you remove the modules on the ends last.

CAUTION

Pull each module straight out when removing. Pulling a module at an angle may damage the connector pins.

All modules removed



Cautions When Assembling the MX150 Base Plate

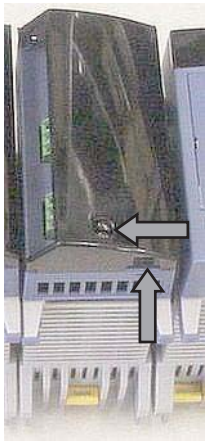
When attaching modules to a Base Plate on which no modules are currently attached, it is easier and safer to first attach the outer modules for stability, then attach the remaining modules. If the Base Plate is attached to a DIN rail, the order in which modules are attached is irrelevant.

7.2 Disassembling the MX110 Analog Input Module

7.2.1 Disassembling the MX110-UNV-H04

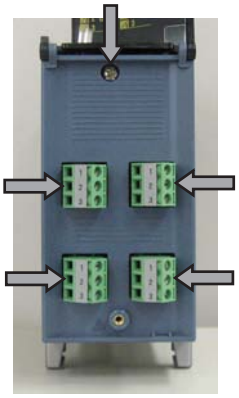
Open the TR Cover

1. Loosen the screw indicated by the upper arrow in the figure below with a flat head screwdriver (the screw will not fall out from the TR Cover, so loosen the screw completely).
2. While pushing the indentation indicated by the lower arrow in the figure below, lift the TR Cover upward and remove.



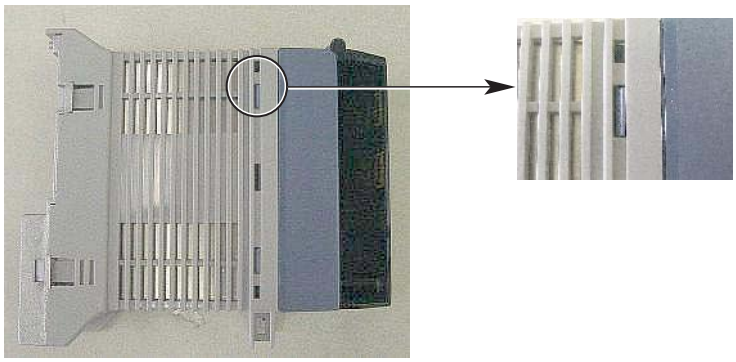
Remove the Terminals

3. Remove the four terminals indicated by the arrows in the figure below (you can pull them out by hand).



Remove the Bezel

4. Push in the tabs indicated by the arrow in the figure below, then remove the Bezel.



Note

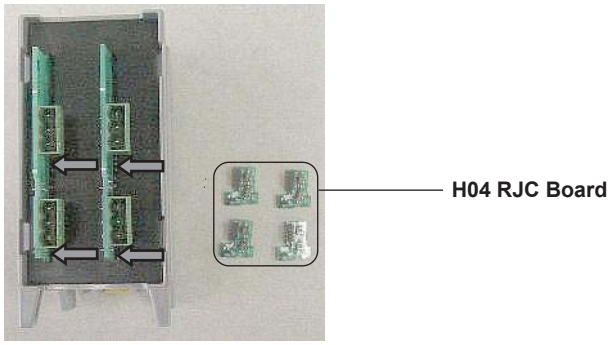
If you free the tabs one by one, it is easier to remove the Bezel.

Remove the H04 RJC Boards

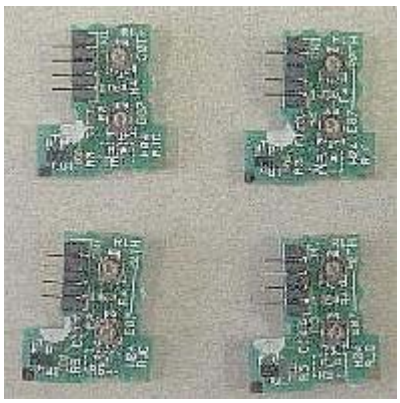
5. Remove the four H04 RJC Boards indicated by the arrows in the figure below.

Note

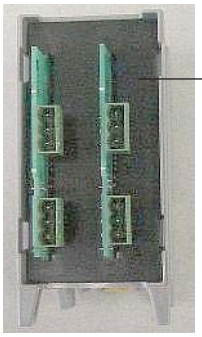
Please take note to replace boards in the same positions when reassembling.



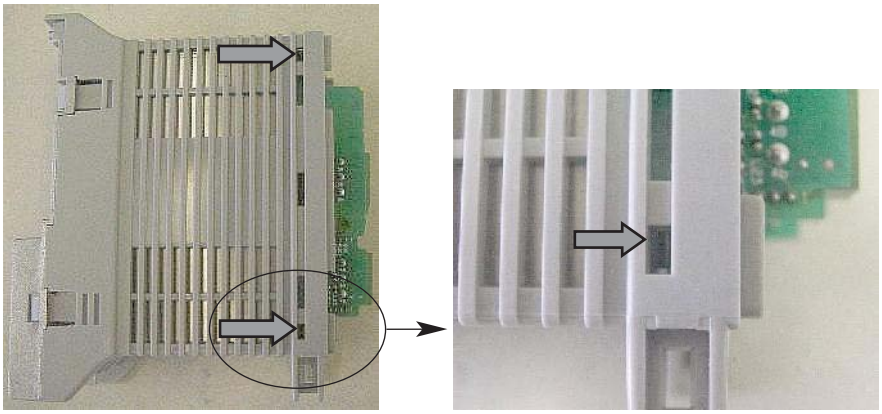
Boards removed (when reassembling, insert them into their original positions)



Remove the Plate

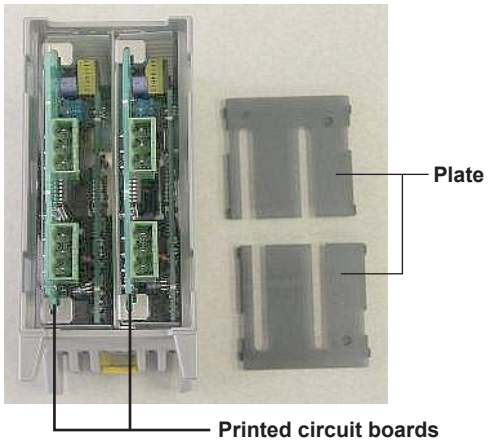


6. Free the tabs indicated by the arrows in the figure below with a pair of tweezers (2 on the left and right sides for a total of 4).



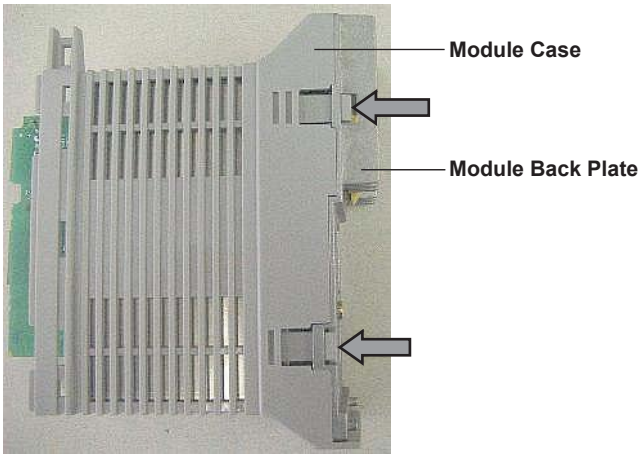
7. Lift up the upper and lower parts of the Plate in the figure above, then pull the Plate out being careful not to touch the 2 printed circuit boards.

Unit with the Plate removed



Remove the Module Case

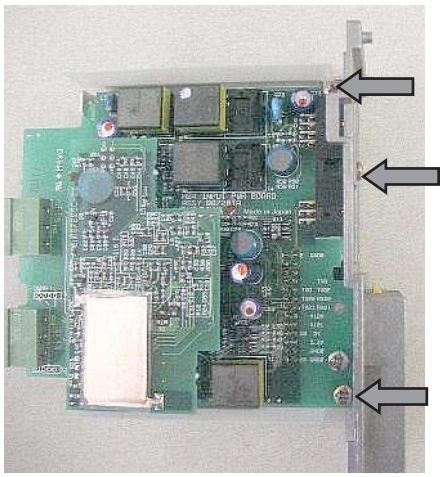
8. Free the tabs indicated by the arrows in the figure below with a pair of tweezers, then pull out the Module Case and Module Back Plate.

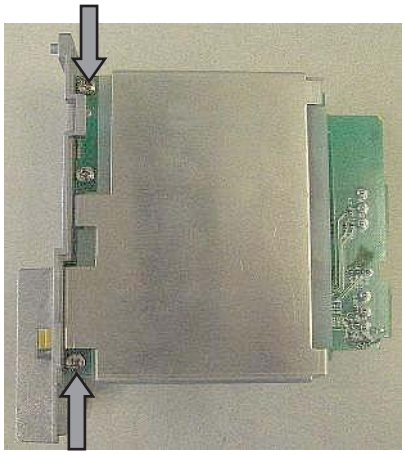


9. Remove the Module Case and the Module Back Plate.

Remove the Module Back Plate

10. Remove the 4 screws and 1 stud as shown in the figure below.

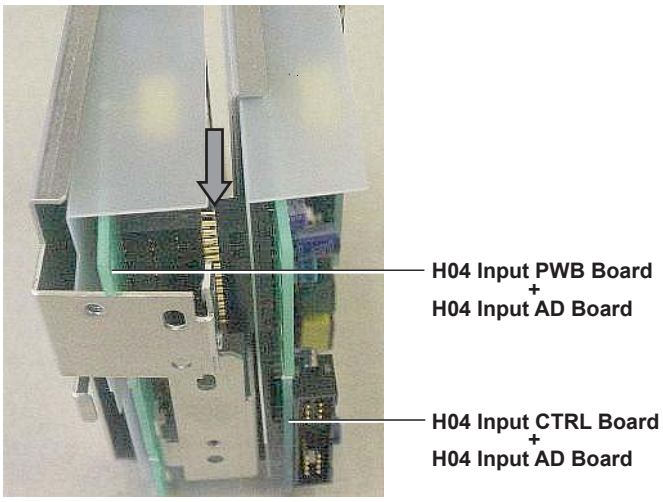




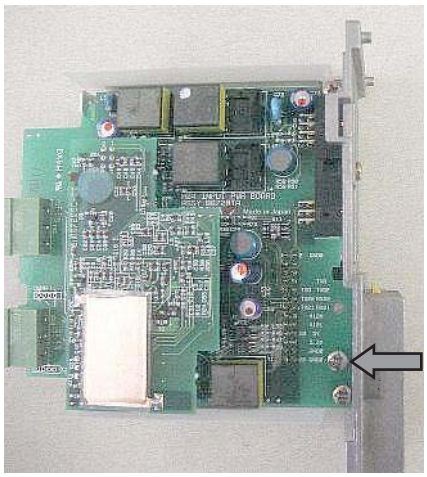
11. Remove the Module Back Plate.

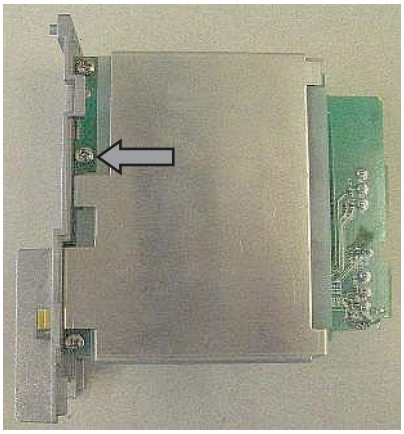
Module Back Plate removed

(the center connectors seem to be coming free, but actually at this point they are totally connected.)



12. Remove the two screws as indicated by the arrows in the figure below.





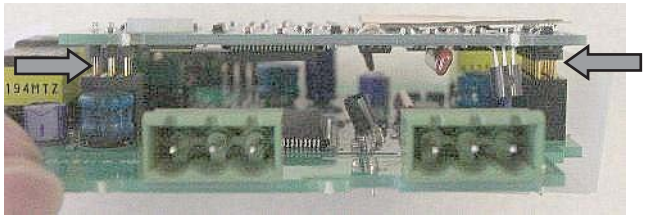
13. Remove the connectors in the figure in step 11, then remove the H04 Input CTRL Board + AD Board and the H04 Input PWR Board + AD Board.

Also remove the fittings for the H04 Input CTRL Board and the H04 Input PWR Board. The plastic plate and H04 are affixed to the IC on the top of the board with adhesive and cannot be removed.

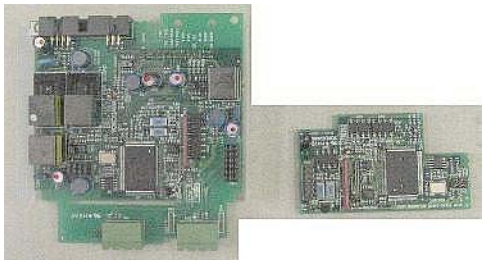
Remove the H04 Input AD Board from the H04 Input PWR Board

14. Remove the two connectors as indicated by the arrows in the figure below. In this case, if you remove only the connectors on one side the connector pins may bend, so you should remove the connectors on both sides simultaneously. To do so, push the lower side of the board in the figure below, then carefully and slowly lift both edges of the board on the upper side alternately to remove.

The H04 Input AD Board and the H04 Input PWR Board are separated.



Unit with the H04 Input AD Board from the H04 Input PWR Board removed

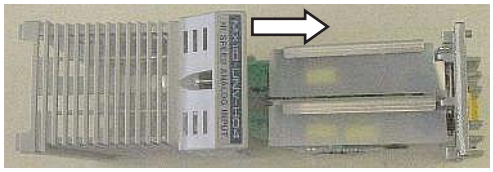


Remove the H04 Input AD Board from the H04 Input CTRL Board

15. In the same manner as in step 16, remove the H04 Input AD Board from the H04 Input CTRL Board.

Cautions during Reassembly

- When reassembling the H04 Input PWR Board and the H04 Input AD Board, make sure to correctly position the connector pins when pushing in (if you push in the boards in the wrong position, fire can result). Take the same precautions when assembling the H04 Input CTRL Board + AD Board and the H04 Input PWR Board + AD Board.
- When attaching the Module Case to a module, insert it as indicated by the arrows in the figure below.



- When attaching the Bezel, ensure that the H04 RJC Board does not come loose from its connectors.
  After attaching it, examine the space for the Bezel Terminal, and check that the H04 RJC Board is connected. If not, remove the Bezel, and reattach the H04 RJC Board.

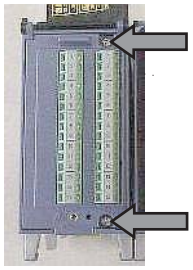
7.2.2 Disassembling the MX110-UNV-M10

Opening the TR Cover

1. See section 7.2.1, “Disassembling the MX110-UNV-H04.”

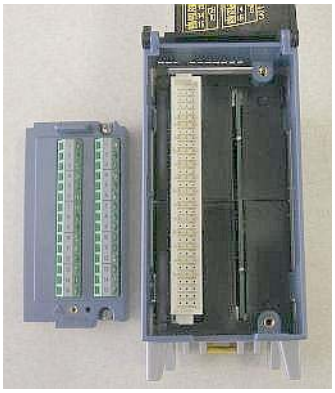
Remove the Front TR Assembly (including the M10 Terminal Board. Only applies if the /NC option is not installed).

2. Loosen the two screws indicated by the arrow in the figure below. The screws cannot fall out, so loosen them completely.



3. Pull out the part indicated by the arrow in the figure below toward you as you look at the figure, and remove the Front TR Assembly. Then remove the screw.

Front TR Assembly removed



Remove the Bezel

4. See section 7.2.1, “Disassembling the MX110-UNV-H04.”

Remove the Plate

5. See section 7.2.1, “Disassembling the MX110-UNV-H04.”

Remove the Module Case

6. See section 7.2.1, “Disassembling the MX110-UNV-H04.”

Remove the Module Back Plate

7. See section 7.2.1, “Disassembling the MX110-UNV-H04.”

Separate the MS Scanner Board and MS Input CTRL Board

8. Follow the procedure in section 7.2.1, “Disassembling the MX110-UNV-H04.”

Cautions during Reassembly

When reassembling the M10 Scanner Board and the M10 Input CTRL Board, make sure to correctly position the connector pins when pushing in (if you push in the boards in the wrong position, fire can result).

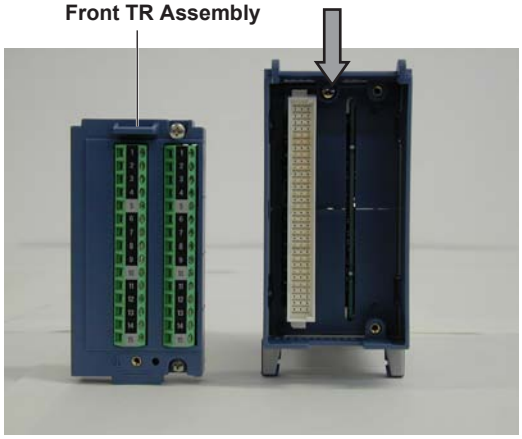
7.3 Disassembling the MX110 6-CH Medium-Speed Four-Wire RTD Resistance Input Module

7.3.1 Disassembling the MX110-V4R-M06

1. Remove the TR Cover, loosen the 2 screws shown in the figure below left, then remove the Front TR Assembly. Then remove the 1 screw shown in the below right.

TR Cover removed

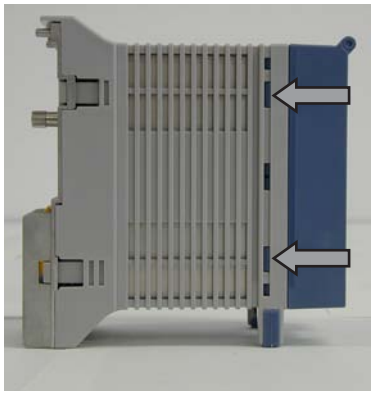
Front TR Assembly



2. Remove the 4 latches from the left and right sides of the Bezel.

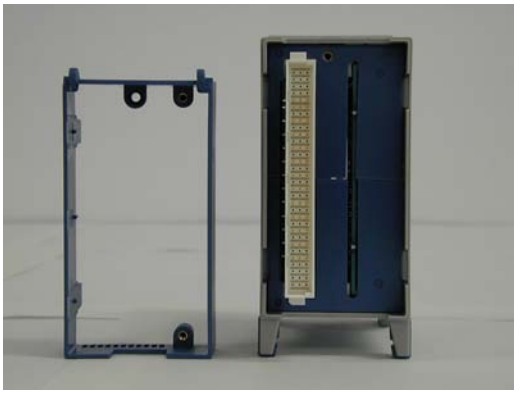
Right side

Left side



3. Pull the Bezel in the direction of the arrow and remove it from the Module case.

Bezel Module case



4. Remove the Plate from the Module case.

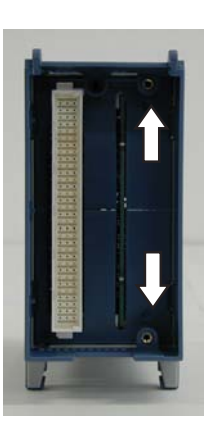
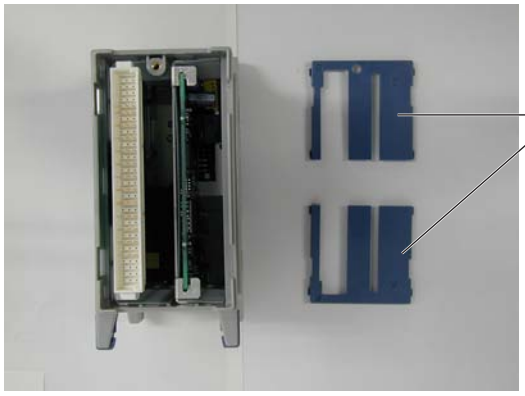
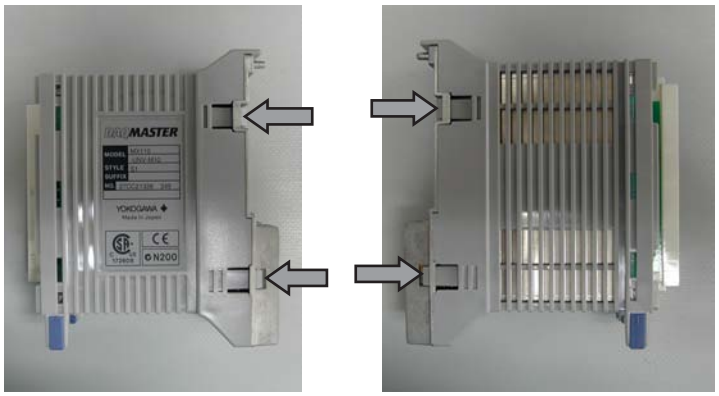


Plate removed



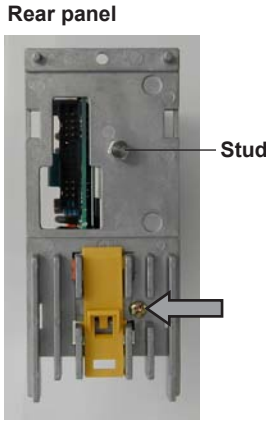
5. Remove the 4 latches from the left and right sides of the Module case.



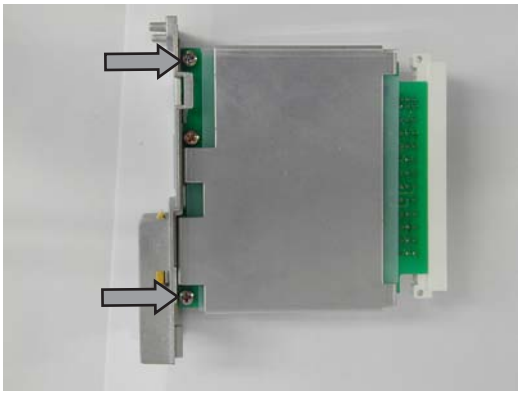
6. Pull the Module case in the direction of the arrow to remove it.

Module case removed

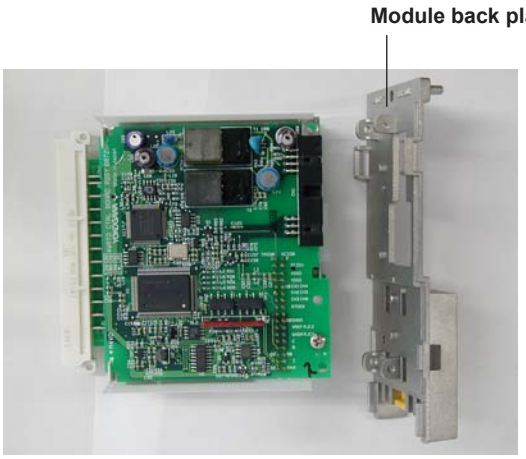
7. Remove the stud and screw from the rear panel.



8. Remove the 4 screws securing the Module back plate on the left and right sides.

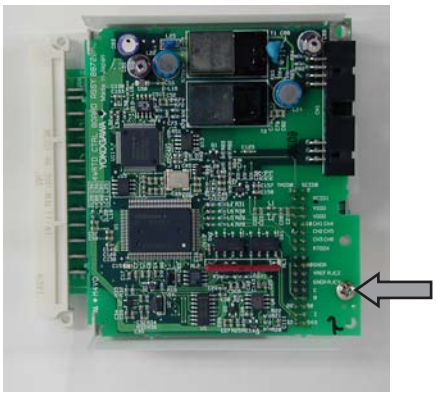


9. Remove the Module back plate.

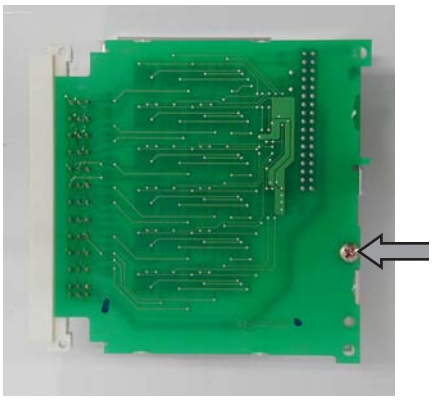


10. Remove the 2 screws shown in the figure below.

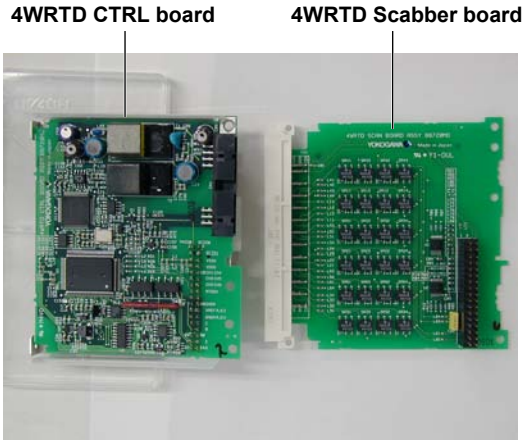
Right side



Left side



11. The assembly separates into the 4 WRTD CTRL board and the 4 WRTD Scanner board.



7.4 Disassembling the MX112 Medium-Speed Strain Input Module

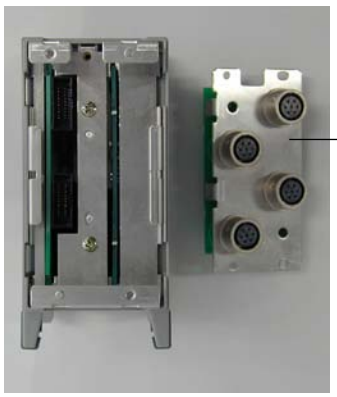
7.4.1 Disassembling the MX112-NDI-M04

1. Remove the terminal cover, then remove the screw.

2. Remove the 4 latches from the left and right sides of the Bezel.

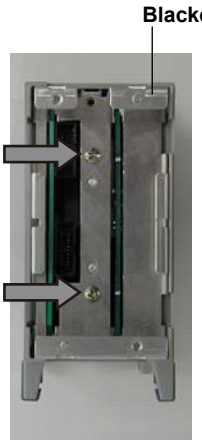
3. Pull the Bezel in the direction of the arrow and separate the Bezel and Module case.

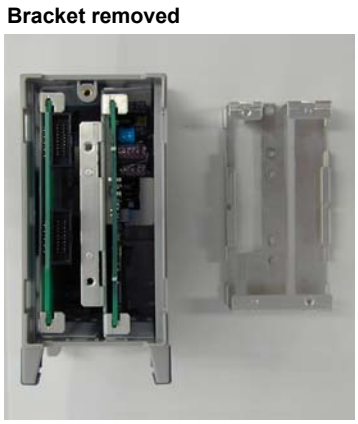
4. Remove the 2 screws.



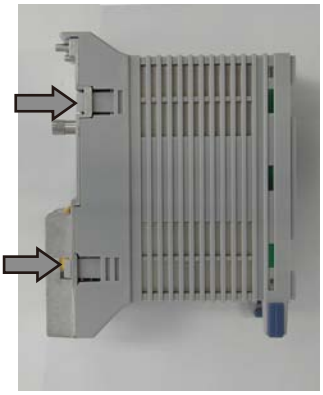
5. Remove the Terminal Assembly.

6. Remove the 2 screws, then remove the Bracket.



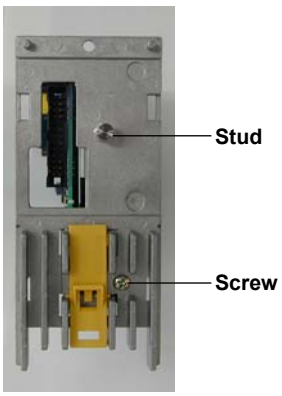


7. Remove the 4 latches from the left and right sides of the Module case.

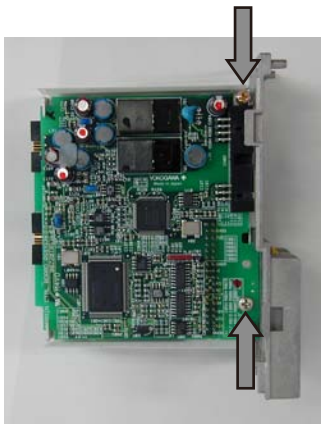


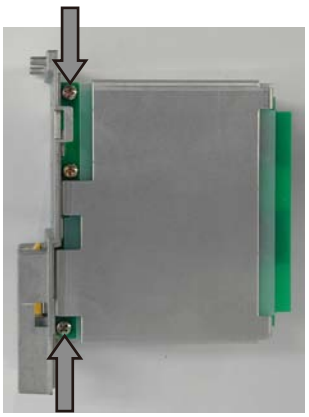
8. Pull the Module case in the direction of the arrow to remove it.

9. Remove the stud and screw.

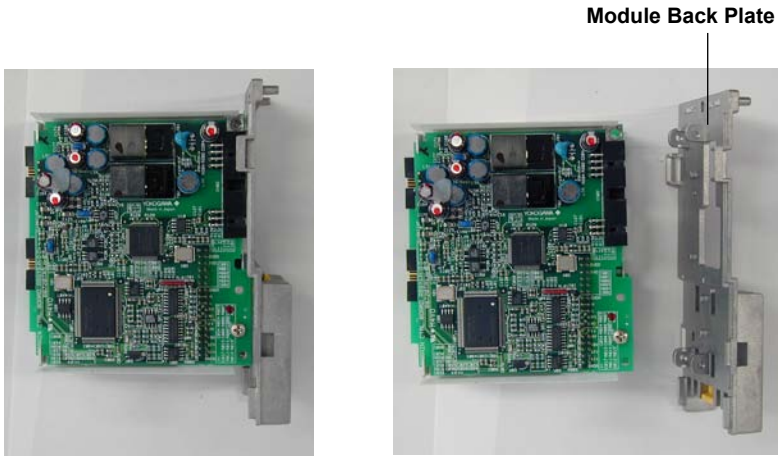


10. Remove the 4 screws from the left and right panels.



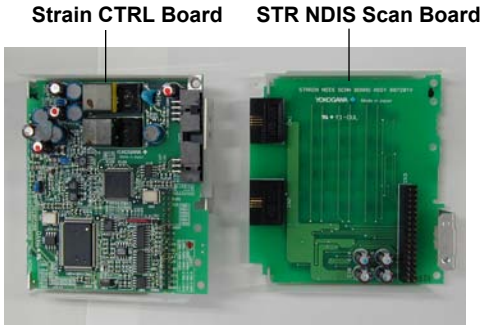


11. Remove the Module Back Plate.



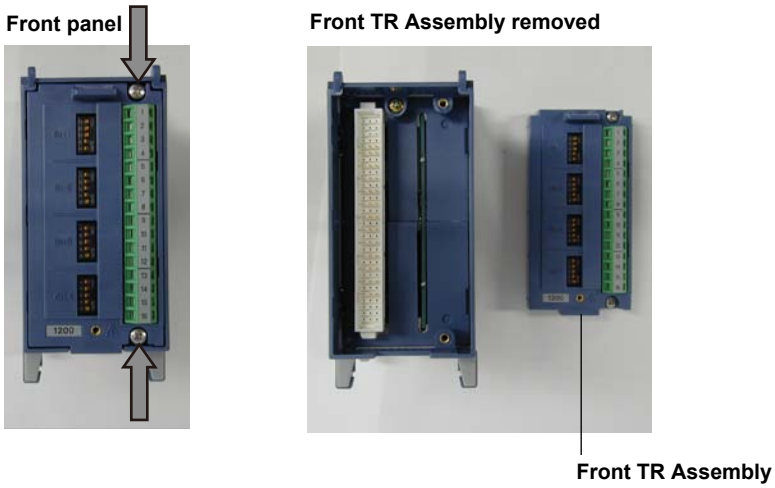
12. Remove the 2 screws shown in the figure.

13. The assembly separates into the Strain CTRL board and the STR NDIS Scan Board.



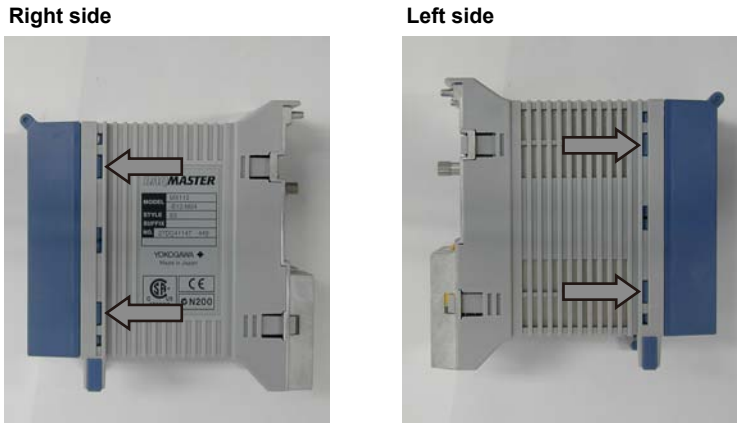
7.4.2 MX112-B12-M04, MX112-B35-M04

1. Remove the 2 screws from the front panel then remove the Front TR Assembly.



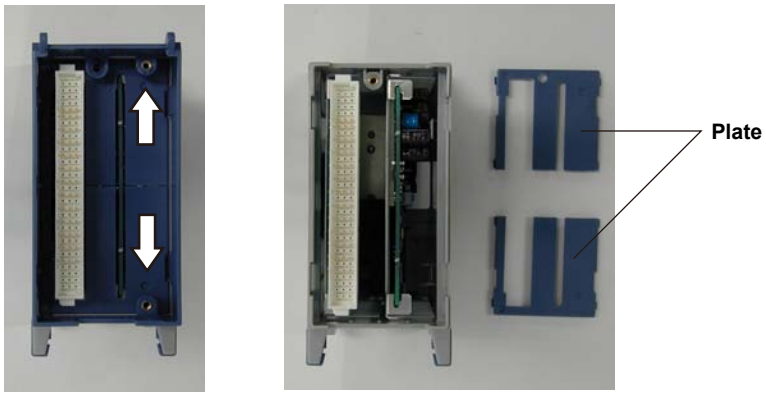
2. Remove the screw.

3. Remove the 4 latches from the left and right sides of the Bezel.

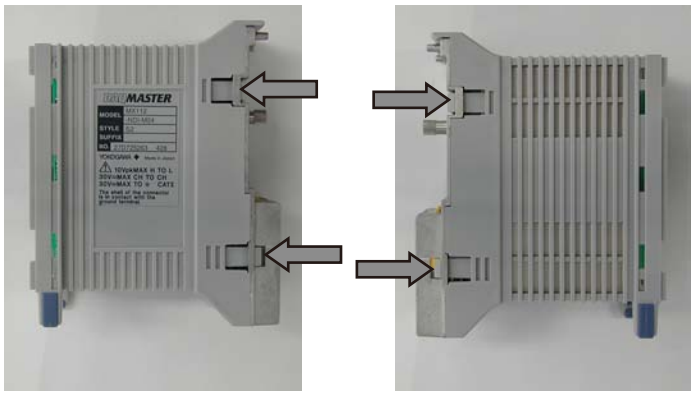


4. Pull the Bezel in the direction of the arrow to remove it.

5. Remove the Plate from the Module Case.



6. Remove the 4 latches from the left and right sides of the Module case.

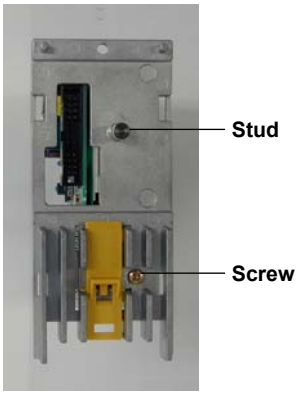


7. Pull the Module Case in the direction of the arrow to remove it.

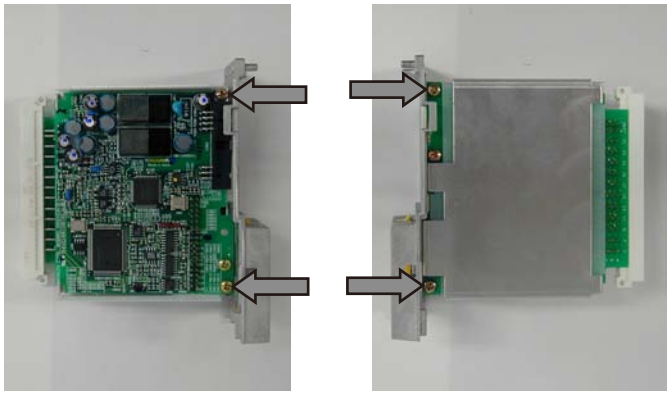
Module Case removed

8. Remove the Stud and Screw from the rear panel.

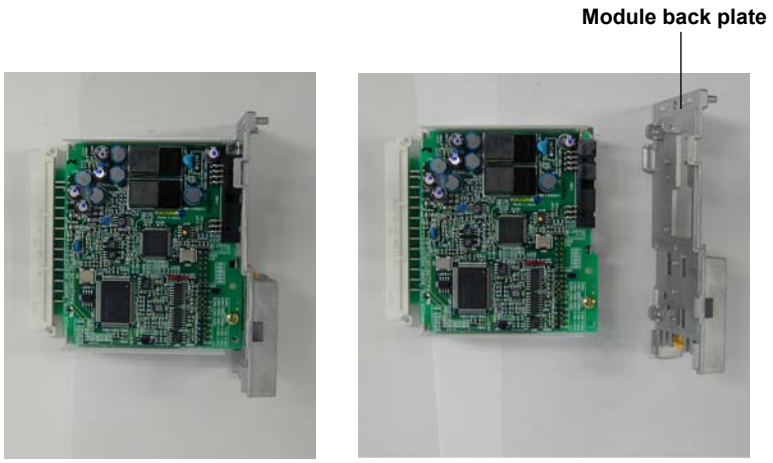
Rear panel



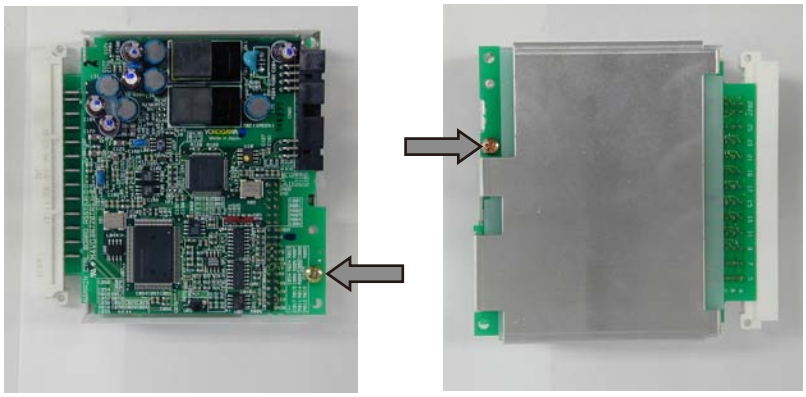
9. Remove the 4 screws from the left and right panels.



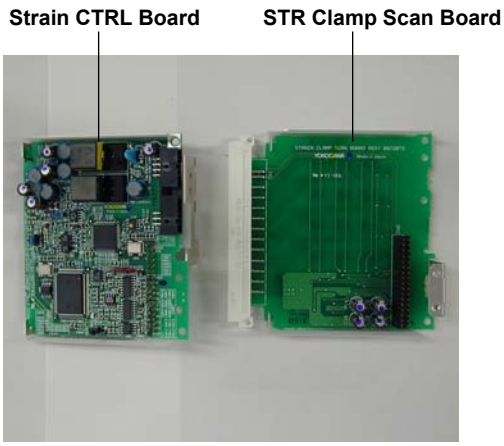
10. Remove the Module Back Plate.



11. Remove the 2 screws shown in the figure.



12. The assembly separates into the Strain CTRL board and the STR Clamp Scan Board.



7.5 Disassembling the MX115 Digital Input Module

Disassemble this module in the same manner as described in 7.2.1, “Disassembling the MX110-UNV-H04.”

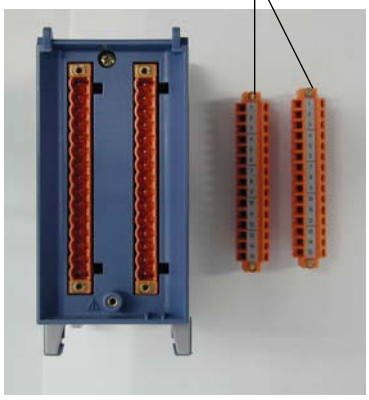
7.6 Disassembling the MX120 Medium-Speed Analog Output Module and the Medium-Speed PWM Output Module

7.6.1 Disassembling the MX120-VAO-M08

1. Remove the TR cover, then remove the RECT Cable connector.

TR Cover removed

Terminal block



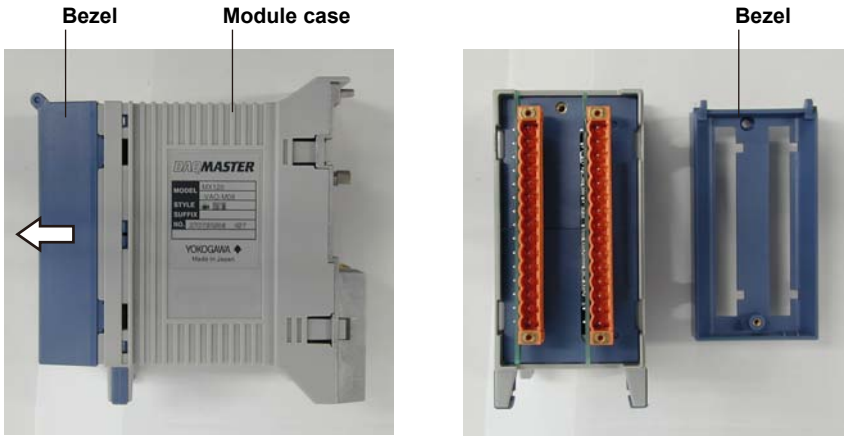
2. Remove the screw.

3. Remove the 4 latches from the left and right sides of the Bezel.

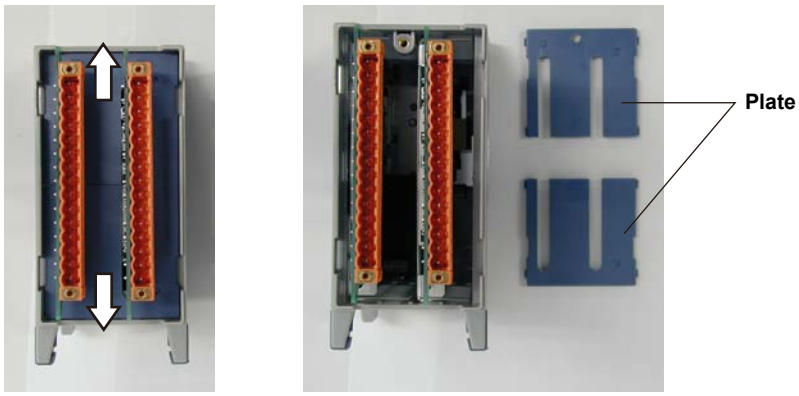
Right side

Left side

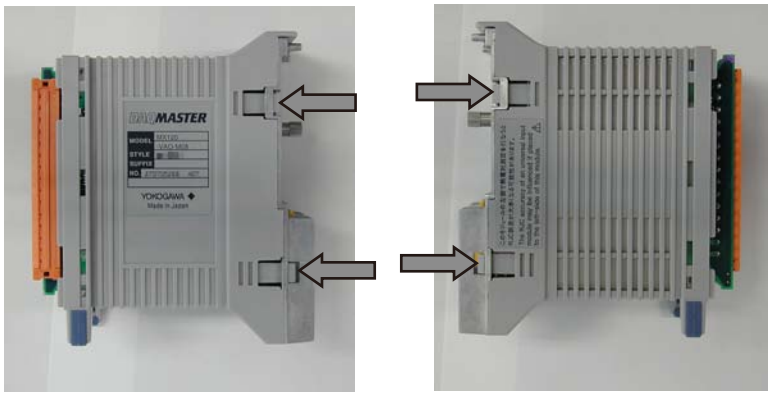
4. Pull the Bezel in the direction of the arrow and remove it.



5. Remove the Plate from the Module case.



6. Remove the 4 latches from the left and right sides of the Module case.



7. Remove the Module case.

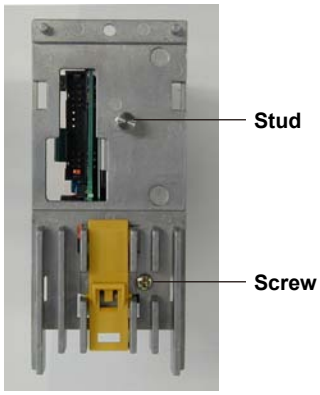
Latches removed

Module case removed

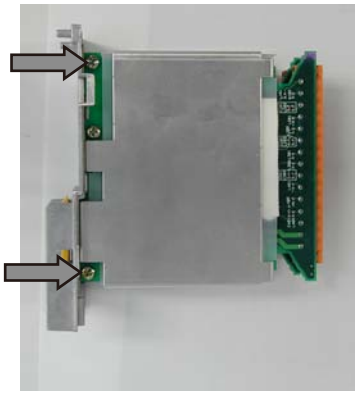
8. Remove the Stud and Screw from the rear panel.

Right side

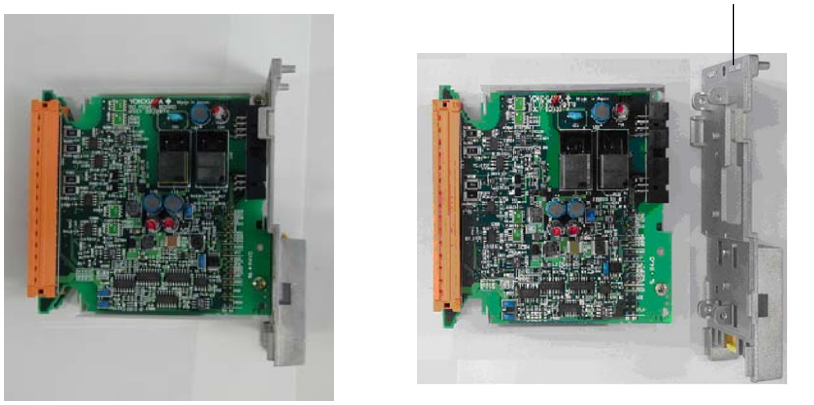
Rear panel



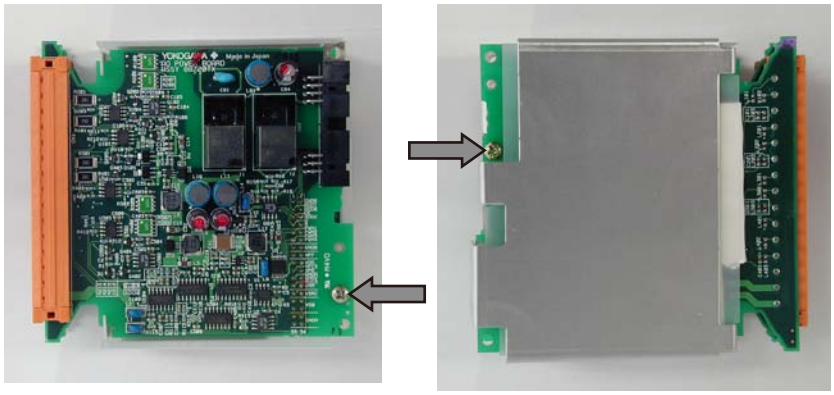
9. Remove the 4 screws from the left and right panels.



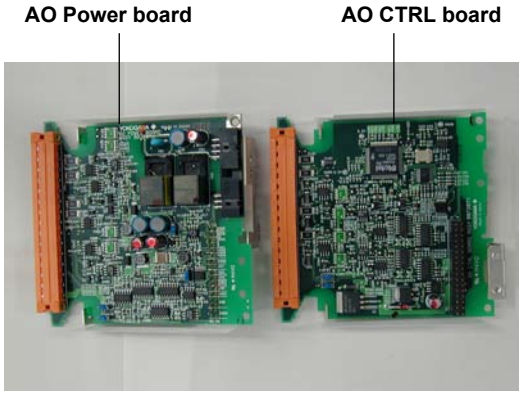
10. Remove the Module back plate.



11. Remove the 2 screws shown in the figure.

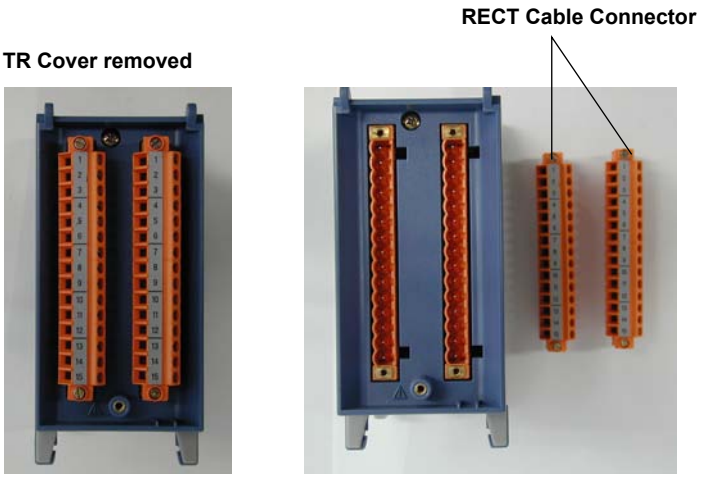


12. The assembly separates into the AO Power board and the AO CTRL board.



7.6.2 Disassembling the MX120-PWM-M08

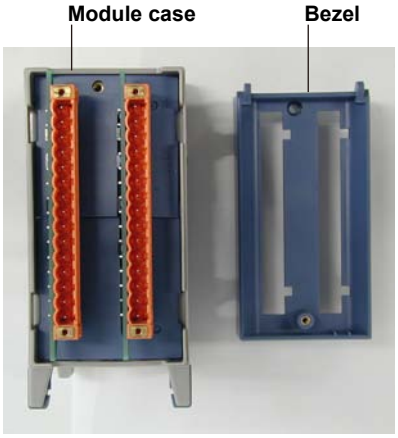
1. Remove the terminal cover, then remove the terminal block.



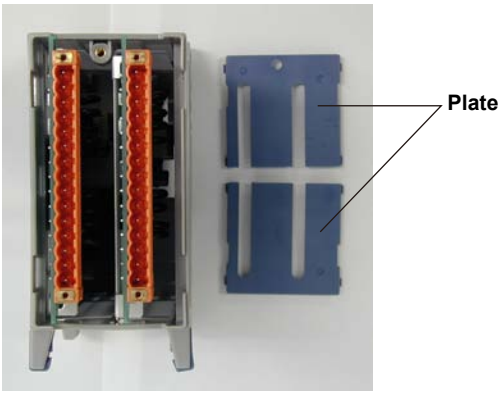
2. Remove the screw.

3. Remove the 4 latches from the left and right sides of the Bezel.

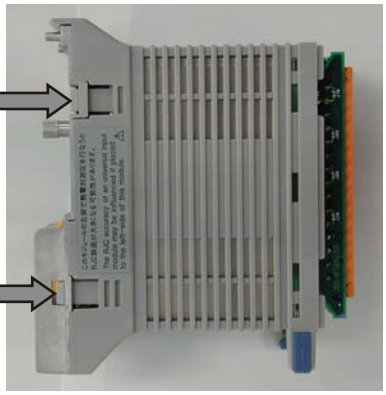
4. Pull the Bezel in the direction of the arrow and remove it from the Module case.



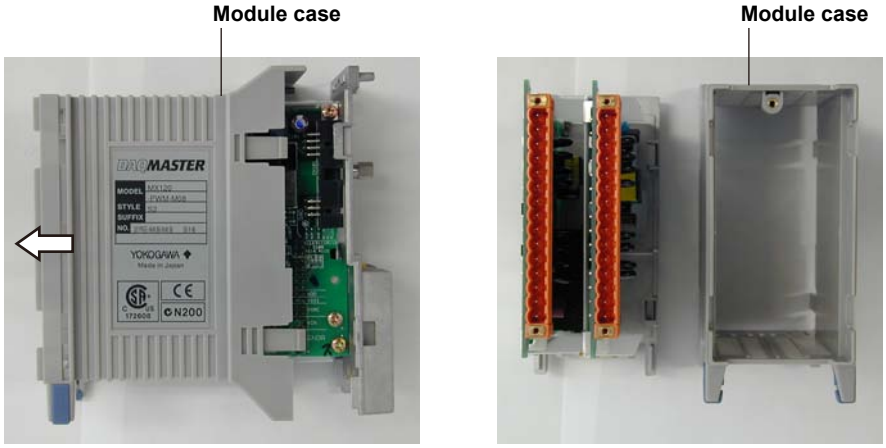
5. Remove the Plate from the Module case.



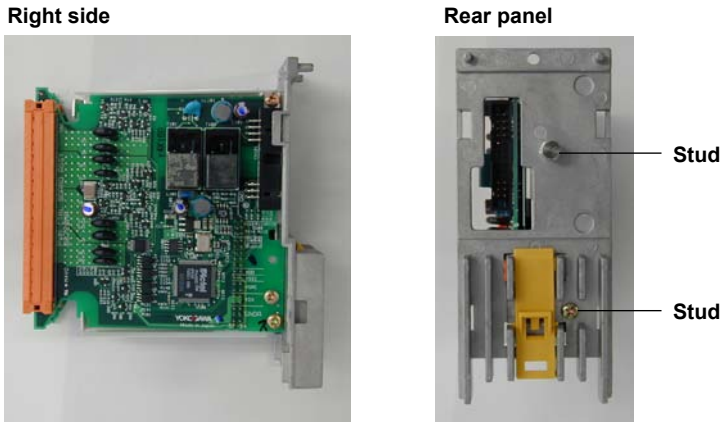
6. Remove the 4 latches from the left and right sides of the Module case.



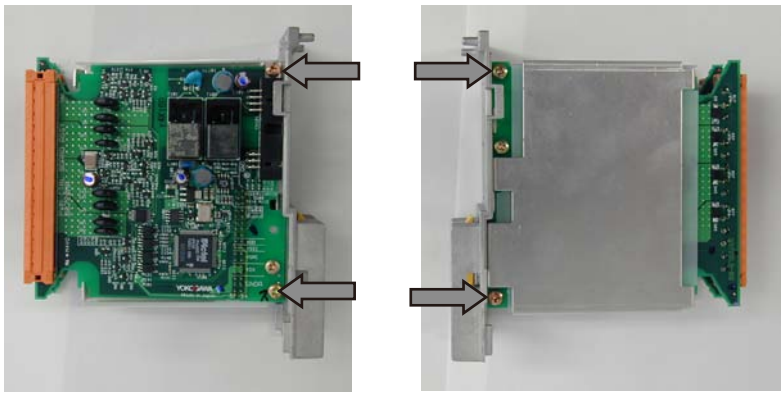
7. Pull the Module case in the direction of the arrow to remove it.



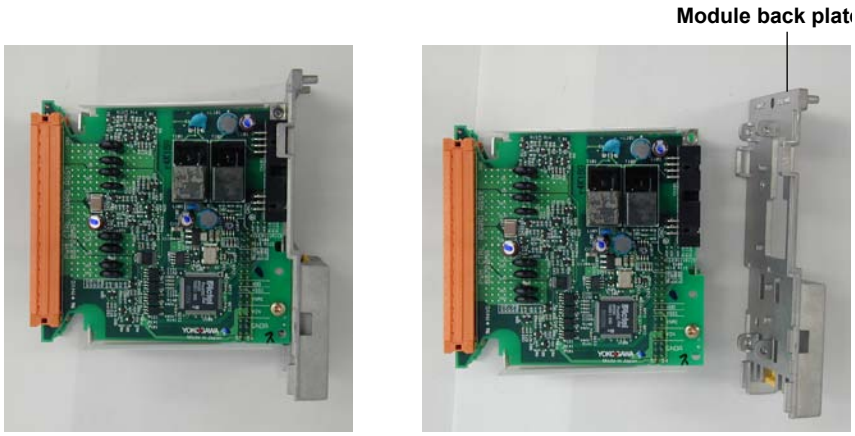
8. Remove the Stud and Screw from the rear panel.



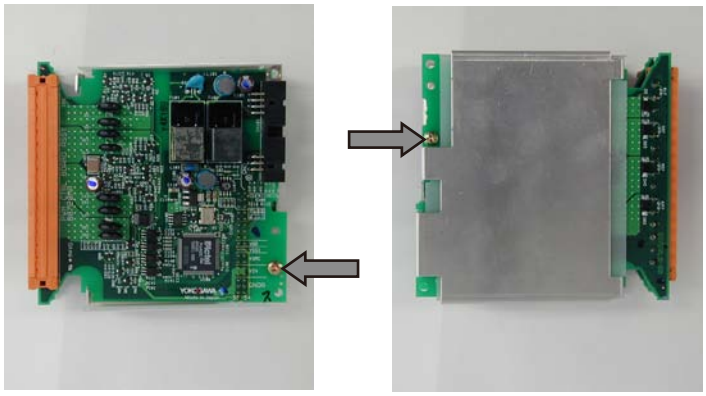
9. Remove the 4 screws from the left and right sides.



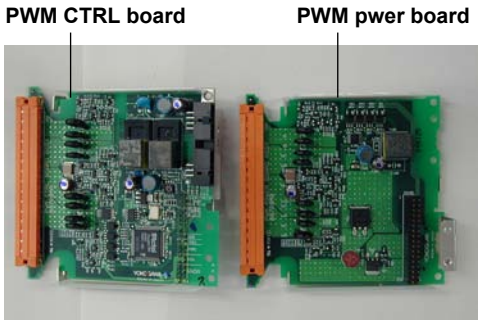
10. The Module back plate comes free.



11. Remove the 2 screws from the left and right sides.



12. The assembly separates into the PWM CTRL board and the PWM Power board.



7.7 Disassembling the MX125 Digital Output Module

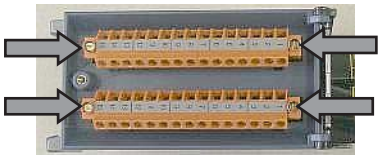
Disassemble the MX125-MKC-M10

Open the TR Cover

1. See section 7.2.1, “Disassembling the MX110-UNV-H04.”

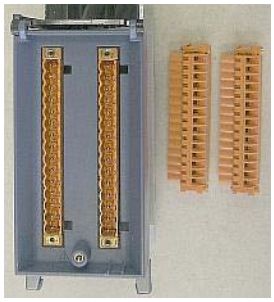
Remove the RECT Cable Conn

2. Loosen the four screws indicated by the arrow in the figure below using a precision driver (flat head). The screws cannot fall out, so loosen the screw completely.



3. Pull out the RECT Cable Conn (if it is difficult to pull out by hand, use a precision driver or other tool to lift up both ends alternately and remove).

RECT Cable Conn rmoved



Remove the Bezel

See section 7.2.1, “Disassembling the MX110-UNV-H04.”

Remove the Plate

See section 7.2.1, “Disassembling the MX110-UNV-H04.”

Remove the Module Case

See section 7.2.1, “Disassembling the MX110-UNV-H04.”

Remove the Module Back Plate

See section 7.2.1, “Disassembling the MX110-UNV-H04.”

Remove the DO Relay Board and DO Power Board

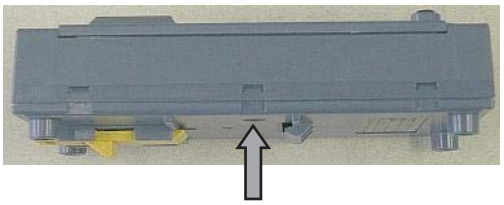
Remove the boards in the same manner as described in section 7.2.1, “Disassembling the MX110-UNV-H04.”

Cautions When Assembling the MX125-MKC-M10

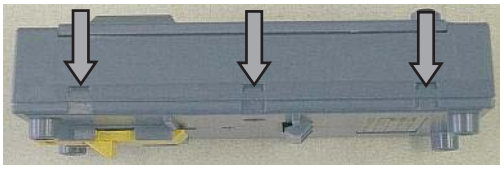
When reassembling the DO Relay Board and the DO Power Board, make sure to correctly position and the connector pins when pushing in (if you push in the boards in the wrong position, fire can result).

7.8 Disassembling the 10ch Screw Terminal Block (772061)

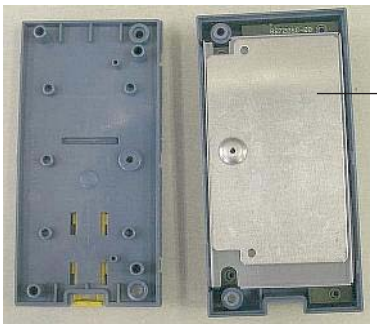
1. Remove the screw indicated by the arrow in the figure below.



2. Free the tabs (there are 3 tabs on the reverse side of the screen for a total of 6) as shown in the figure below.



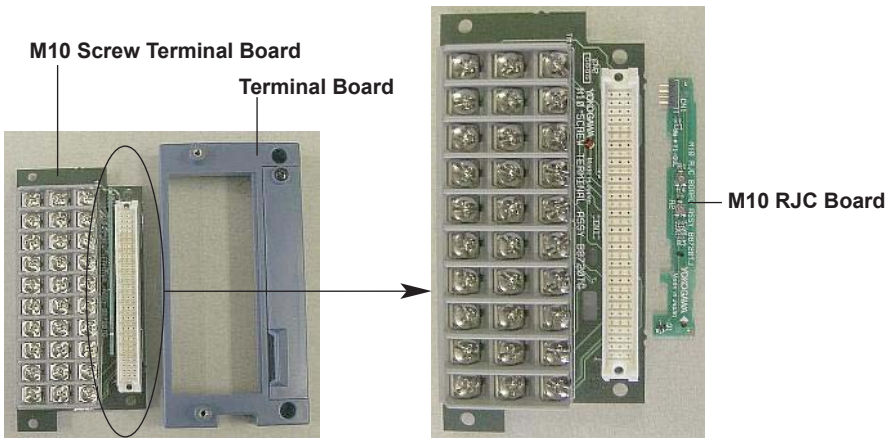
3. Remove the Terminal Base.



4. Remove the bracket.

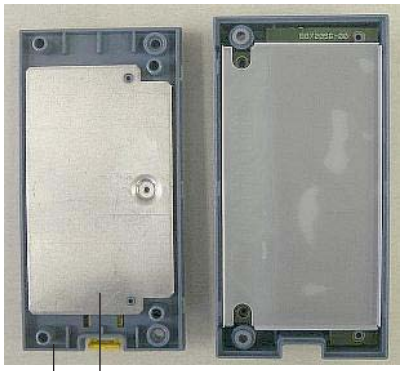
   The M10 Screw Terminal and Sheet are affixed with adhesive and cannot be removed.

5. Disassemble the M10 Screw Terminal Board, Terminal Cover, and M10 RJC Board.



Cautions When Reassembling the 772061-10ch Screw Terminal Block

When assembling, place the Bracket on the Terminal Base side, and while holding the Bracket in place, cover the Terminal Base with the Terminal Cover as in the figure below.

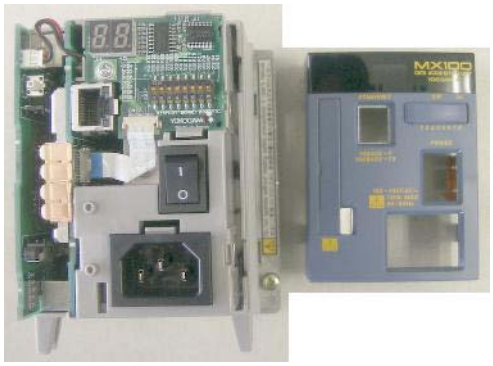


7.9 Disassembling the MX100 Main Module

Remove the Bezel Assembly from the Main Module

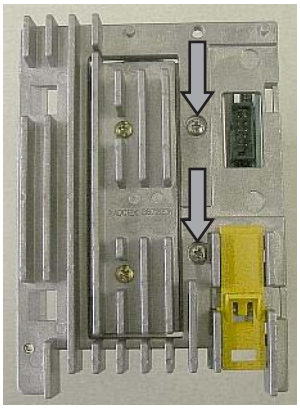
1. See section 7.2.1, “Disassembling the MX110-UNV-H04.”

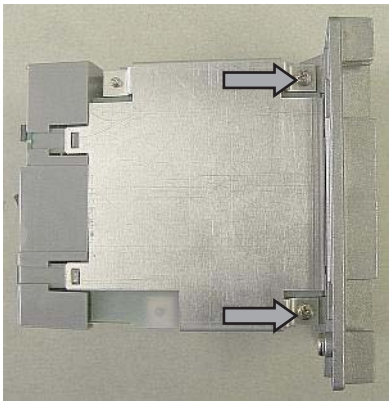
Bezel Assembly removed from the MX100 Main Module

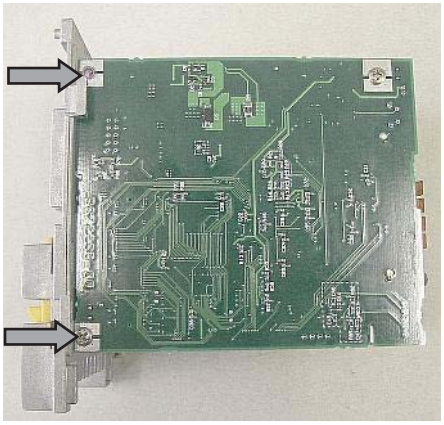


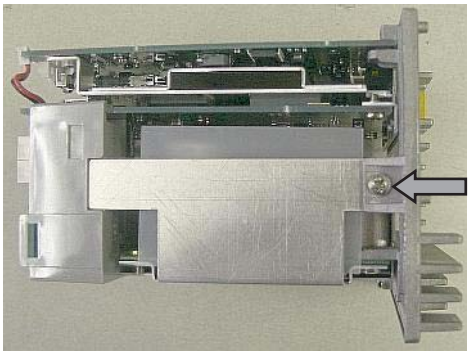
Remove the CPU Back Plate

2. Remove all the screws (7) indicated in the figure below.



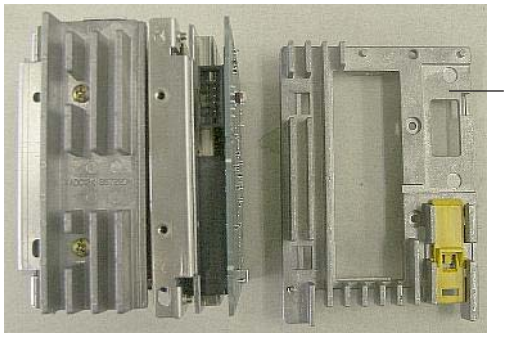






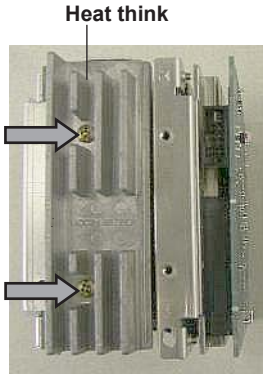
3. Remove the CPU Back Plate.

CPU Back Plate removed



Remove the Heat Sink

4. Remove the 2 screws as shown in the figure below.

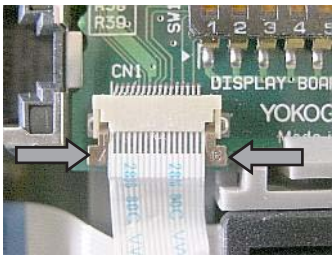


5. Remove the Heat Sink.

Remove the CPU Assembly

6. The figure in step 5 as is shown in the figure below as seen from the left side. Remove the connectors shown by the arrows.

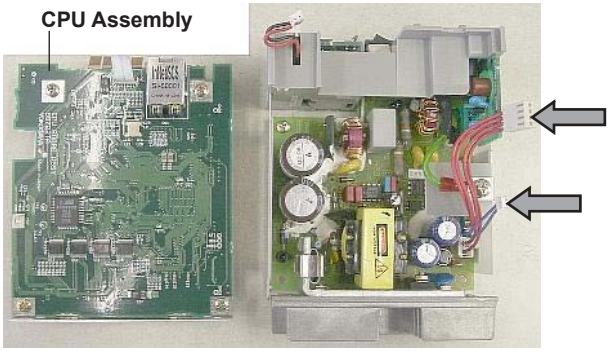
7. Lift the left and right side of the part indicated by the arrows of connector CN1 in the figure below. The SUMICARD comes out.



Note

When attaching the SUMICARD to a connector, insert the flat cable all the way into the connector, then push in the part indicated by the arrows.

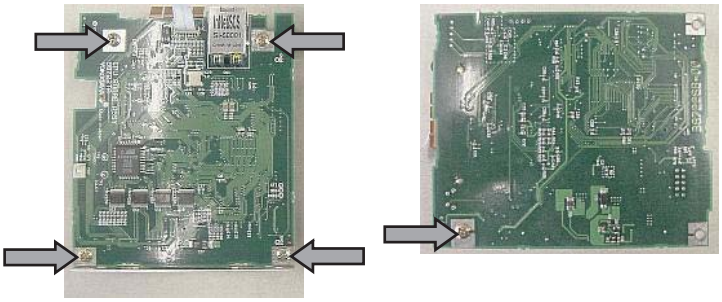
8. Remove the 2 cables on the right side of the figure below.



9. Remove the CPU Assembly

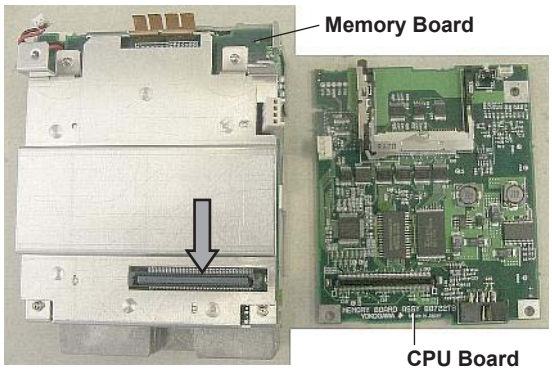
Remove the CPU Board and Memory Board from the CPU Assembly

10. Remove the five screws as indicated by the arrows in the figure below.



11. The CPU Board and Memory Board are connected by the connector at the arrow in the figure below.

Remove the CPU Board and Memory Board from the CPU Assembly.



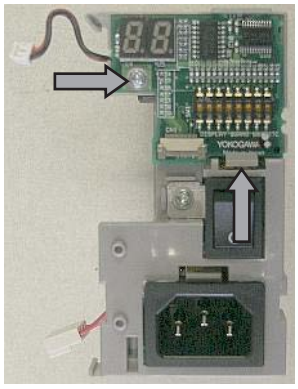
CAUTION

The connector for the CPU Board and Memory Board are surface-mounted. If you try to remove them forcibly, you might break off the soldering. Remove the boards slowly and carefully.

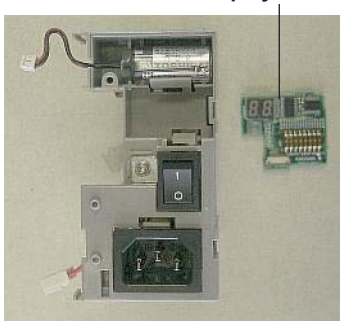
Remove the Display Board and Battery Assembly

12. Remove the screw indicated by the arrow in the top of the figure below.

13. Push down the tab indicated by the lower arrow in the figure below, and pull out the Display Board.



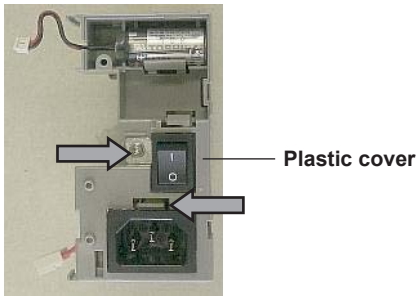
Unit with the Display Board removed



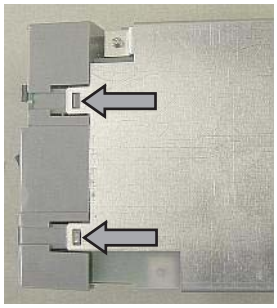
14. Remove the Battery Assembly.

Remove the Adapter

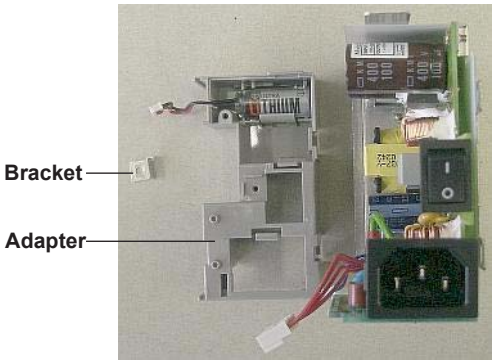
15. Remove the screw indicated by the arrow in the top of the figure below.
Then push the tab indicated by the arrow in the bottom of the figure below.



16. Free the two tabs indicated by the arrow in the figure below.



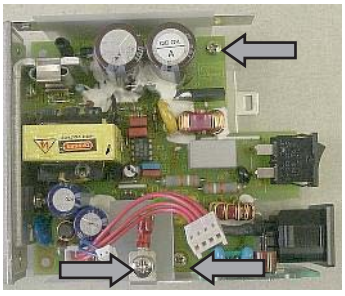
17. Remove the adapter



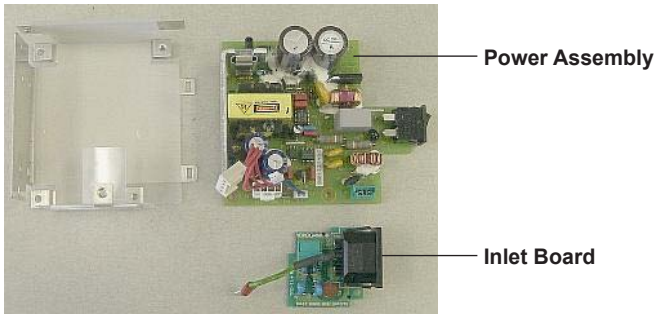
Disassembling the Power Assembly

18. Remove the three screws as indicated by the arrows in the figure below.

19. Pull out the Inlet Board (-M) (or, if the power supply inlet is -W, the part corresponding to the Inlet Board is removed)



20. Remove the Power Assembly and Inlet Board.



Cautions When Reassembling the MX110 Main Module

The MX100 Main Module uses 4 types of screws, so be sure to use the correct screws when reassembling it.

- : Screws for the attaching the CPU Back Plate (2)
- : Screws for the attaching the Display Board and fittings to the plastic cover (2)
- : Standard screws
- Other: Screws for fastening the earth on the Inlet Board and the metal plate.

7.10 Disassembling the MW100 Main Module

Left side

Right side

Bottom panel

1. Remove the screw from the bottom panel of the MW100.

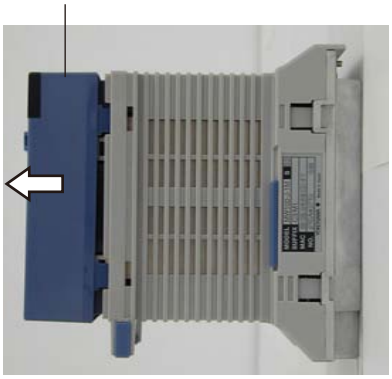
2. Remove the 4 latches from the left and right sides of the Bezel.

Right side

Left side

3. Pull the Bezel in the direction of the arrow to remove it.

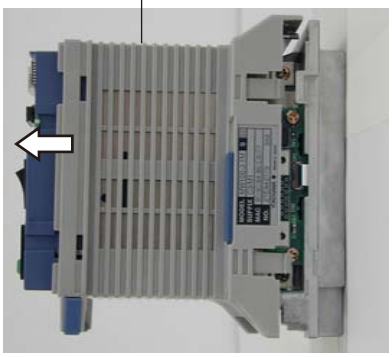
Bezel



4. Remove 2 latches each from both the left and right sides (for a total of 4) of the case shown in the figure.

5. Pull the case in the direction of the arrow and remove it.

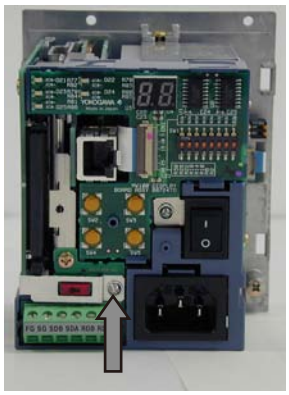
Case



Case removed

6. Remove the screw from the front panel.

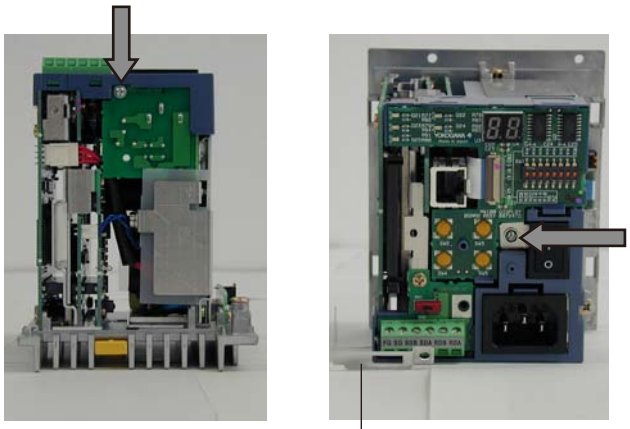
Front panel



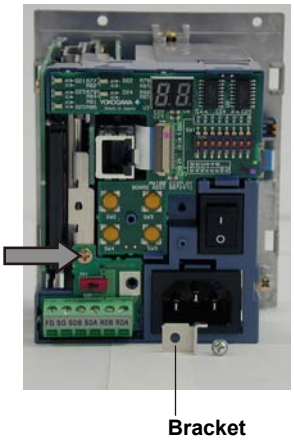
Left side

7. Remove the screw from the left panel.

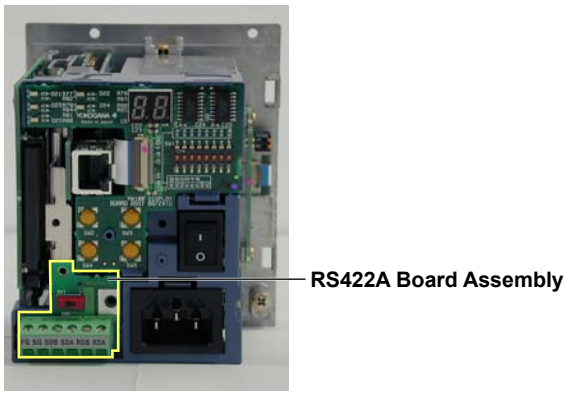
8. Remove the screw shown in the figure.
9. Remove the screw shown in the figure, then remove the bracket.



10. Remove the screw shown in the figure, then remove the RS422A Board Assembly.



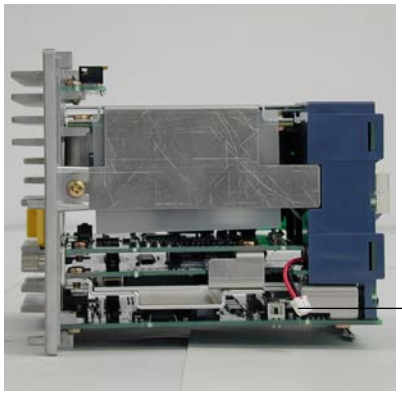
RS422A Board Assembly removed



12. Release the RS422A board Assembly's connector lock, then remove the SUMICARD.

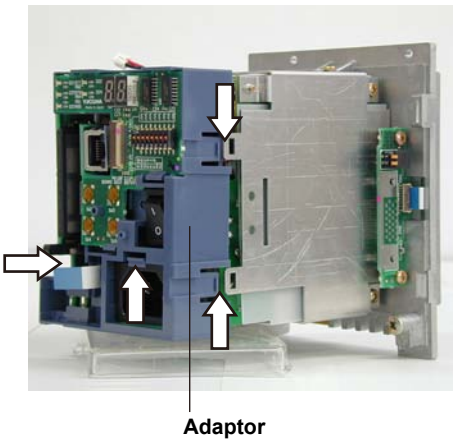
13. Release the Display board Assembly's connector lock, then remove the Flexible printed circuit board.

14. Remove the Battery connector from the left panel.



15. Remove 4 latches shown in the figure.

Adapter & Display board removed.

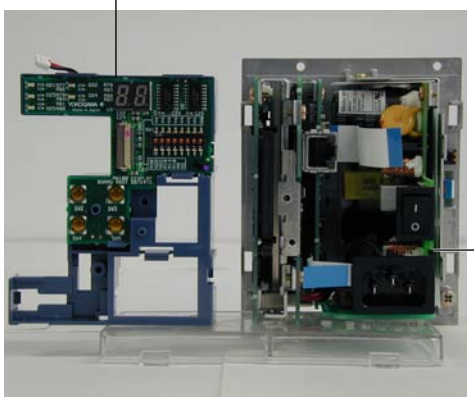


Adaptor

16. Remove the Adaptor & display board.

Adapter & Display board removed.

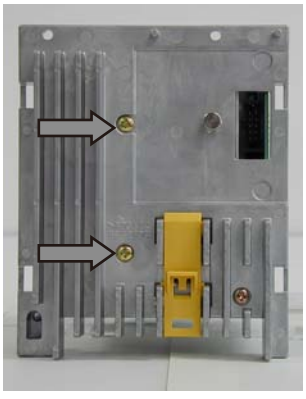
Adaptor & Display board



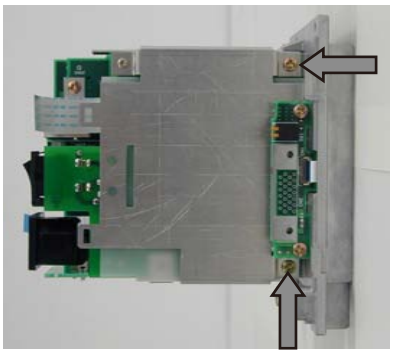
CPU Assy & Power Assembly

17. Remove the 2 screws from the back panel, and the 2 screws from the right panel.

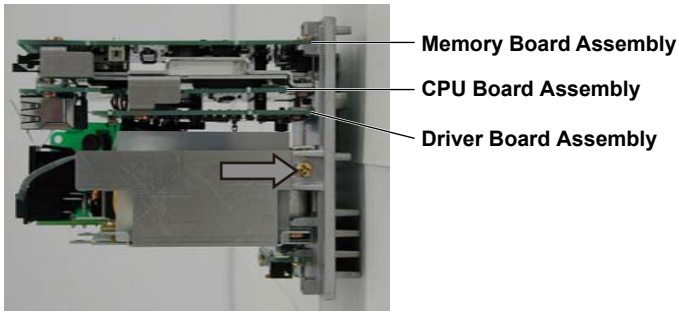
Rear panel



Right side

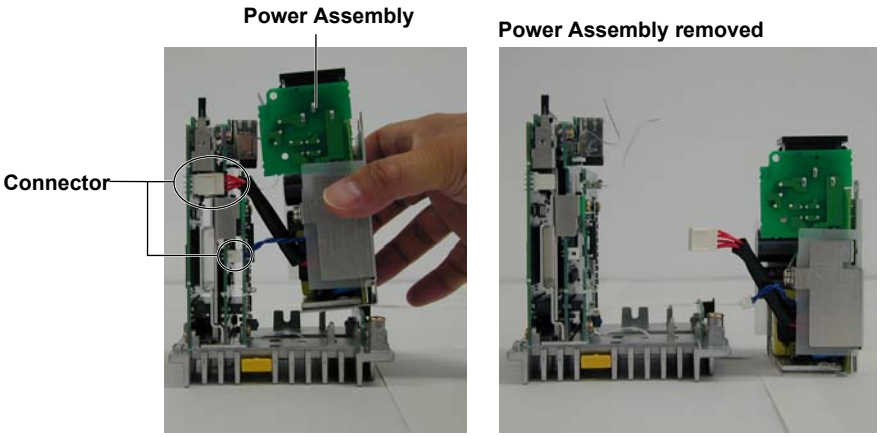


18. Remove the screw from the left panel.

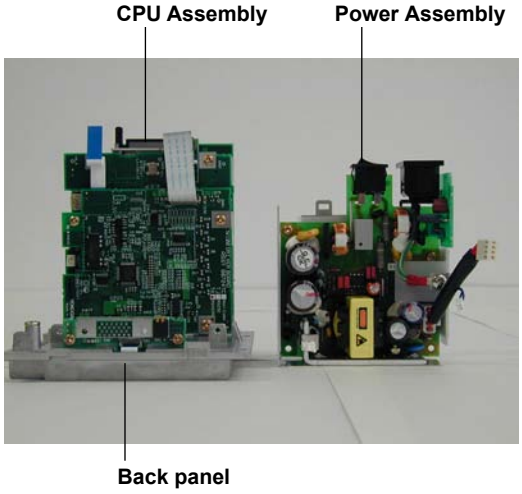


19. Remove the connector and remove the Power Assembly.

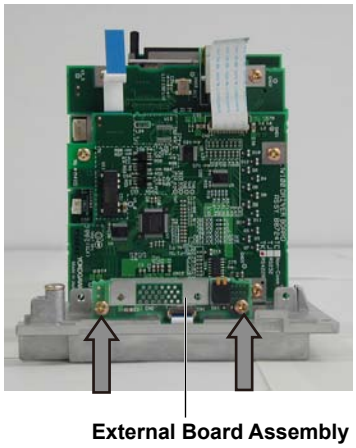
Power Assembly removed



Power Assembly and CPU Assembly removed



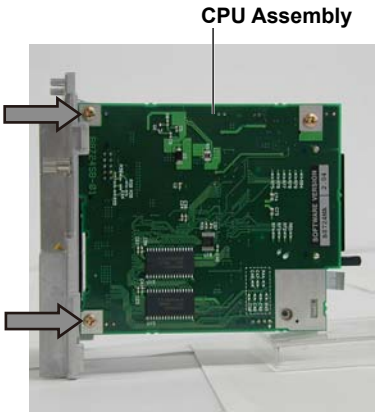
20. Remove the 2 screws securing the External Board Assembly.



21. Release the External Board Assembly connector lock and remove the board from the SUMICARD.

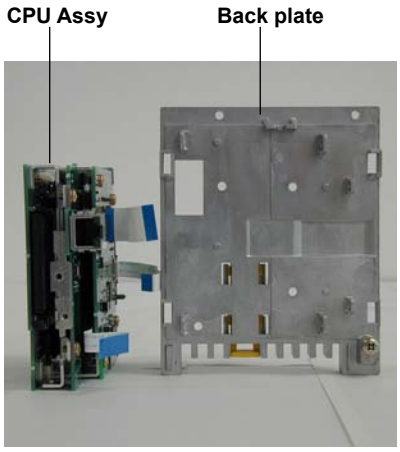
External Board Assembly removed

22. Remove the 2 screws from the CPU Assembly.

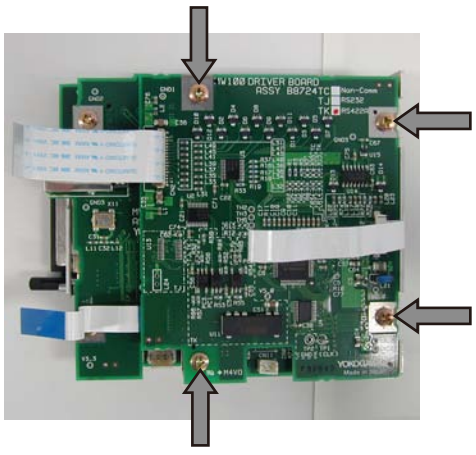


23. Remove the stud and screw from the rear panel.

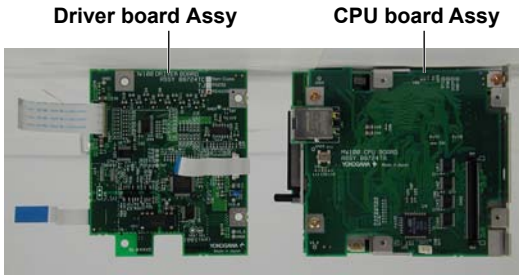
24. The assembly separates into the CPU Assembly and Back plate.



25. Remove the 4 screws from the Driver board Assembly.

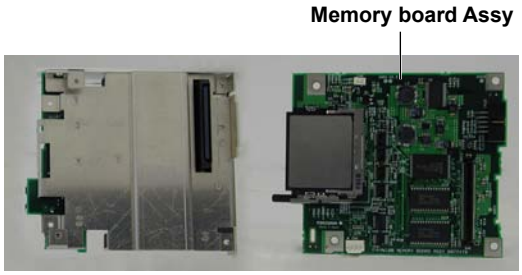


26. Remove the Driver board Assembly.

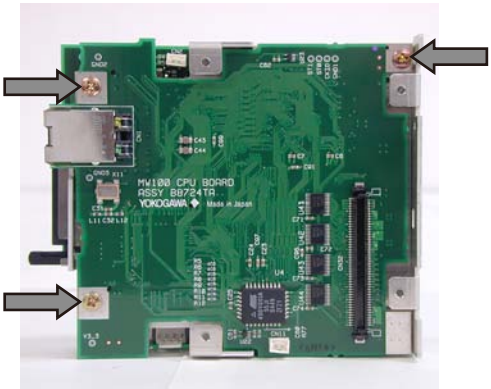


27. Remove the screw from the Memory board Assembly.

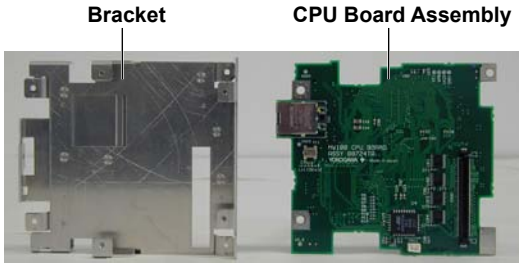
28. Remove the Memory board Assembly.

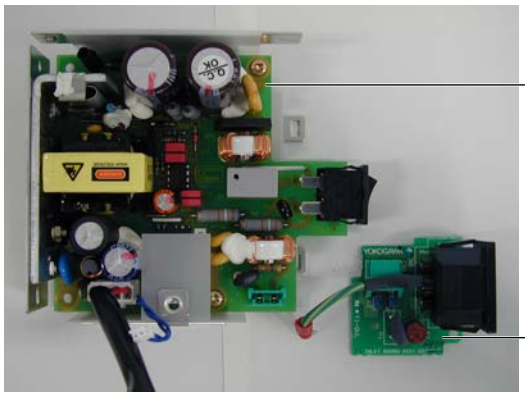


29. Remove the 3 screws from the CPU board Assembly.



30. The assembly separates into the CPU Board Assembly and Bracket.



31. Remove the screw from the Power Assembly then remove the protective grounding cable.

32. The assembly separates into the AC Power Inlet board Assembly and Power Assembly.